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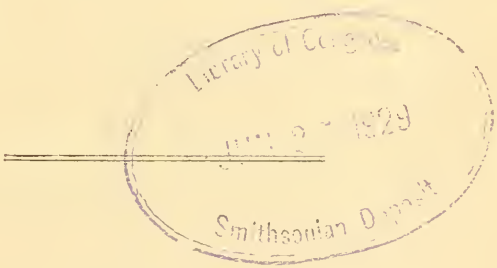

LONDON:
PUBLISHED BY THE SOCIETY AND SOLD AT ITS ROOMS
41 QUEEN'S GATE, S.W. 7

1922-1923.

QL 401
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DATES OF PUBLICATION IN PARTS.

Parts I, II (TRANS., p. 1–274) . . .	published 31 July, 1922
„ III, IV („ 275–594) . . .	„ 17 February, 1923
Part V (PROC., i–cvi)	„ 5 May, 1923

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List of Fellows

OF THE

ENTOMOLOGICAL SOCIETY OF LONDON.

HONORARY FELLOWS.

Date of Election.

1900 Aurivillius, Professor Christopher, *Stockholm.*

1915 Berlese, Professor Antonio, *via Romana*, 19, *Firenze, Italy.*

1905 Bolivar, Ignacio, *Museo nacional de Historia natural, Hipodromo*, 17, *Madrid.*

1911 Comstock, Prof. J. H., *Cornell University, Ithaca, New York, U.S.A.*

1894 Forel, Professor Auguste, M.D., *Yvorne, Canton de Vaud, Switzerland.*

1898 Grassí, Professor Battista, *The University, Rome.*

1915 ‡ Howard, Dr. L. O., *Chief, Bureau of Entomology, U.S. Dept. of Agriculture, Washington, U.S.A.*

1914 Lameere, Professor A., 74, *rue Defacq, Bruxelles.*

1918 Marchal, Dr. Paul, President of the Entomological Society of France, 45, *rue de Verrières, Antony, Seine, France.*

1908 Oberthür, Charles, *Rennes, Ille-et-Vilaine, France.*

1913 Tian-Shanski, A. P. Semenoff, *Vassili Ostrov*, 8 *lin.*, 39, *Petrograd, Russia.*

1911 Wasmann, Fr. Erich, S.J., *Valkenburg (L.) Ignatius Kolleg, Holland.*

SPECIAL LIFE FELLOWS.

Date of Election.

1921 * (1862) Sharp, David, M.A., M.B., F.R.S., F.L.S., F.Z.S. (Pres., 1887–8; V.-Pres., 1889, 1891–2, 1896, 1902–3; Sec., 1867; Council, 1893–5, 1902–4), *Lawnside, Brockenhurst, Hants.*

1916 (1888) Yerbury, Colonel John W., late R.A., F.Z.S. (Council, 1896, 1903–5), 2, *Ryder-street, St. James's*, S.W. 1.

FELLOWS.

(The names of those who have not yet paid either the Entrance Fee or the first year's subscription are not included.)

Marked * *died during the year* 1922.
Marked † *have compounded for their Annual Subscriptions.*
Marked ‡ *have been admitted into the Society (to Dec.* 1921).

Date of Election.

1914 †‡ Adair, E. W., B.A., *Turf Club, Cairo, Egypt.*

1913 ‡ Adams, B. G., 15, *Fernshaw-road, Chelsea*, S.W.

1902 ‡ Adkin, Benaiah Whitley, *Trenoweth, Hope-park, Bromley, Kent.*
1885 ‡ Adkin, Robert (V.-Pres., 1922; Council, 1901–2, 1911–13, 1921–), *Hodeslea, Meads, Eastbourne.*
1921 Alexander, Prof. C. P., *Fernald Hall, Mass. Agricultural College, Amherst, Mass.*
1922 Allen, Donald, 21, *All Saints'-road, King's Heath, Birmingham.*
1912 Allen, J. W., M.A., 266, *Willesden-lane, London,* N.W. 2.
1920 ‡ Altson, A. M., 26 *Addison Mansions, Blythe-road, W. Kensington,* W. 14. All communications to *College of Science, Entomological Department, Exhibition-road,* S.W. 7.
1911 Anderson, T. J., *Entomological Laboratory, Kabete, Brit. E. Africa.*
1919†‡Andrewes, Christopher Howard, 1, *North-grove, Highgate,* N. 6.
1910†‡Andrewes, H. E. (Council, 1920–22), 8, *North-grove, Highgate,* N. 6.
1899 ‡ Andrews, Henry W., *Woodside, Victoria-road, Eltham,* S.E. 9.
1901 ‡ Anning, William, 39, *Lime Street,* E.C. 3.
1908 † Antram, Charles B., *Somerdale Estate, Ootacamund, Nilgiri Hills, S. India.*
1913 ‡ Armytage, Edward O., *Ingleby, Armytage, Victoria, Australia.*
1907 ‡ Arnold, G., D.Sc., A.R.C.S., *Rhodesia Museum, Bulawayo, South Africa.*
1899†‡Arrow, Gilbert J. (Council, 1905–7), 9, *Rossdale-road, Putney,* S.W. 15 ; and *British Museum (Natural History), Cromwell-road,* S.W. 7.
1922 Arthur, Francis, M.R.C.S., L.R.C.P., 395, *Bethnal Green-road, E.* 2.
1911 ‡ Ashby, Edward Bernard, 36, *Bulstrode-road, Hounslow, Middlesex.*
1907†‡Ashby, Sidney R., 8, *Elm Tree-road, St. John's Wood,* N.W. 8.
1921 Atkinson, Dennis Jackson, *Ataran Forest Division, Moulmein, Burma.*
1886 Atmore, E. A., 48, *High-street, King's Lynn.*
1914 Awati, P. R., Medical Entomologist, c/o Grindlay & Co., Bankers, 26, *Westmorland-street, Calcutta.*

1922 Bacchus, Arthur Douglas Reginald, 29, *Abbotsford-road, Redland, Bristol.*
1901*‡Bacot, Arthur W. (Council, 1916–18), *York Cottage, York-hill, Loughton, Essex.*
1904†‡Bagnall, Richard S., 5, *Higham Place, Newcastle-on-Tyne.*
1909 ‡ Bagwell-Purefoy, Capt. Edward, *East Farleigh, Maidstone.*
1916 ‡ Balfour, Miss Alice, 4, *Carlton-gardens,* S.W., and *Whittingehame, Prestonkirk, Scotland.*
1921 ‡ Balfour-Browne, F. M., F.R.S.E., F.Z.S., *Oaklands, Fenstanton, St. Ives, Hunts.*
1912 Ballard, Edward, Govt. Entomologist, *Agricultural College and Research Institute, Coimbatore, Madras, S. India.*
1886 ‡ Bankes, Eustace R., M.A.
1890 Barclay, Francis H., F.G.S., *The Warren, Cromer.*
1895 Barker, Cecil N., 81, *Bellevue-road, Durban, Natal, South Africa.*

1920 ‡ Barns, Thomas Alexander, F.Z.S., 32, *Windsor-court, Bayswater, W. 2.*

1902 ‡ Barraud, Philip J., *Central Research Institute, Kasauli, Punjab, India.*

1907 ‡ Bartlett, H. Frederick D., 1, *Myrtle-road, Bournemouth.*

1894†‡Bateson, Prof. William, M.A., F.R.S., Fellow of St. John's College, Cambridge, *The Manor House, Merton, Surrey.*

1908 Bayford, E. G., 2, *Rockingham-street, Barnsley.*

1904 Bayne, Arthur F., c/o Messrs. Freeman, *Castle-street, Framlingham, Suffolk.*

1912 ‡ Baynes, Edward Stuart Augustus, 39, *Rowland Gardens,* S.W. 7.

1896†‡Beare, Prof. T. Hudson, B.Sc., F.R.S.E. (V.-Pres., 1910; Council, 1909–11), 10, *Regent Terrace, Edinburgh.*

1908 ‡ Beck, Richard, 97, *Pilton-street, Barnstaple.*

1912 Bedford, Gerald, Entomologist to the Union of South Africa, Veterinary Bacteriological Laboratory, *Ondestepoort, Pretoria, Transvaal.*

1913 Bedford, Capt. Hugh Warren, *W.T.R. Laboratories, Khartoum, Sudan.*

1899 ‡ Bedwell, Ernest C. (V.-Pres., 1922; Council, 1917–19, 1922–), *Bruggen, Brighton-road, Coulsdon, Surrey.*

1920 ‡ Beeson, C. F. C., *Indian Forest Service, Forest Research Institute, Dehra Dun, U.P., India.*

1904 Bengtsson, Simon, Ph.D., Lecturer, *University of Lund, Sweden;* Curator, Entomological Collection of the University.

1915 Benham, Prof. William Blaxland, M.A., D.Sc., F.R.S., *University of Otago, Dunedin, New Zealand.*

1906 ‡ Bentall, E. E., *The Towers, Heybridge, Essex.*

1913 ‡ Best-Gardner, Charles C., *Rookwood, Neath, Glamorgan.*

1920 ‡ Bethell, George, F.R.Hist.S., F.L.A., 11, *Chandos-street,* W. 1.

1885 ‡ Bethune-Baker, George T., F.L.S., F.Z.S. (Pres., 1913–14; V.-Pres., 1910–11, 1915; Council, 1895, 1910–15, 1919–21), 20, *Newbold Terrace, Leamington Spa.*

1918 Beveridge, Brigadier-Gen. W. W. O., C.B., D.S.O., R.A.M.C., 45*a*, *Chester-square,* S.W. 1.

1891 ‡ Blaber, W. H., F.L.S., 34, *Cromwell-road, Hove, Brighton.*

1904 ‡ Black, James E., F.L.S., *Nethercroft, Peebles.*

1920 Blackmore, E. H., Pres. Brit. Columbia Ent. Soc., *P.O. Box* 221, *Victoria, B.C.*

1904 ‡ Blair, Kenneth G. (Council, 1918–20), *Claremont,* 120, *Sunningfields-road, Hendon,* N.W. 4.

1921 Blenkarn, S. A., 44, *Rannock Lodge, Grovelands-road, Purley, Surrey.*

1904 ‡ Bliss, Maurice Frederick, M.C., M.R.C.S., L.R.C.P., 130, *High Town-road, Luton, Beds.*

1916 ‡ Bocock, Charles Hanslope, *The Elms, Ashley, Newmarket.*

1912 Bodkin, G. C., Govt. Entomologist, *Georgetown, British Guiana.*

1903 Bogue, W. A., *The Bank House, Watchet.*
1911 Boileau, H., 99, *Rue de la Côte St. Thibault, Bois de Colombes, Seine, France.*
1921 Bolton-King, E., *Balliol College, Oxford.*
1891 Booth, George A., F.Z.S., M.B.O.U., *The Hermitage, Kirkham, Lancs.*
1902 ‡ Bostock, E. D., *Oulton Cross, Stone, Staffs.*
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1913 Bowater, Lieut.-Col. William, 23, *Highfield-road, Edgbaston, Birmingham.*
1894 † Bowles, E. Augustus, M.A., *Myddelton House, Waltham Cross.*
1912 † Bowring, C. Talbot, Commissioner of Customs, *c/o Hongkong & Shanghai Bank,* 9, *Gracechurch-street,* E.C. 3.
1921 ‡ Box, H. E., *c/o Messrs. S. Dawson & Co., Ltd., Plantation Blairmont, New Amsterdam, British Guiana.*
1919 ‡ Box, Lieut. L. A., 35, *Great James-street,* W.C. 1.
1910 Boyd, A. Whitworth, *Frandley House, nr. Northwich.*
1920 Boyd, Major John Erroll Moritz, M.C., R.A.M.C., *Pendarey, Birchington-on-Sea.*
1905 Bracken, Charles W., B.A., 5, *Carfrae Terrace, Lipson, Plymouth.*
1919 Bradley, Prof. J. Chester, M.Sc., Professor of Entomology and Curator of Invertebrate Zoology, *Cornell University, Ithaca, New York, U.S.A.*
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1920 ‡ Brenchley, Dr. Winifred E., D.Sc., F.L.S., *Rothamsted Experimental Station, Harpenden, Herts.*
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1896†‡Burr, Malcolm, D.Sc., F.G.S., A.R.S.M. (V.-Pres., 1912 ; Council, 1903–4, 1910–12), 29, *Holmdale-road, West Hampstead*, N.W. 3.

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1868†‡Butler, Arthur G., Ph.D., F.L.S., F.Z.S. (Sec., 1875 ; Council, 1876), *The Lilies, Beckenham-road, Beckenham.*

1883 ‡ Butler, Edward Albert, B.A., B.Sc. (Council, 1914–16), 35, *Kyrle-road, West Side, Clapham Common*, S.W. 11.

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1905 ‡ Butterfield, James A., B.Sc., *Ormesby*, 21, *Dorville-road, Lee*, S.E.

1914 † Butterfield, Rosse, Curator, *Corporation Museum, Keighley, Yorks.*

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1902 ‡ Cameron, Malcolm, M.B., R.N. (Council, 1919–20), *Forest Research Institute, Dehra Dun, U.P., India.*

1898 Candèze, Léon, *Mont St. Martin* 75, *Liège.*

1880 Cansdale, W. D., *Sunny Bank, South Norwood*, S.E. 25.

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1892 ‡ Carpenter, The Hon. Mrs. Beatrice, 22, *Grosvenor-road*, S.W. 1.

1919 Carpenter, Cyril F., 2302, 13*th Street, Sacramento, California, U.S.A.*

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1915 Carr, Professor John Wesley, M.A., F.L.S., F.G.S., Professor of Biology, *University College, Nottingham.*

1912 Carter, Henry Francis, 7, *Courthope Villas, Worple-road, Wimbledon*, S.W. 19. All communications to *The Bacteriological Institute, Colombo, Ceylon.*

1906 ‡ Carter, H. J., B.A., *Garraicillah, Kintore-street, Wahroonga, Sydney, N.S.W.*

1921 Casling, P. V., *c/o* Alliance Bank of Simla, *Peshawar, India.*

1921 Cassels, O. C., D.F.C., N.D.A., Hon. Dip. (Harper-Adams A. C.), *La Cumbre, Ottery St. Mary, Devon.*

1921 Castle, Miss Amy, *Asst. Entomologist, Dominion Museum, Wellington, New Zealand.*

1921 Cator, Douglas, 13, *Westminster-mansions, Gt. Smith-street*, S.W. 1.
1889†‡Cave, Charles J. P., *Stoner Hill, Petersfield.*
1920 ‡ le Cerf, F., Curator of the Lepidoptera in the Paris Museum, 13, *rue Guy de la Brosse, Paris.*
1900 Chamberlain, Neville, *Westbourne, Edgbaston, Birmingham.*
1871 ‡ Champion, George C., F.Z.S., A.L.S. (Librarian, 1891–1920; Council, 1875–7, 1921); *Bromhall-road, Horsell, Woking;* and 45, *Pont-street*, S.W. 1.
1914 ‡ Champion, Harry George, B.A., Assistant Conservator of Forests, *W. Almora, U.P., India.*
1919 Chatterjee, Nibaran Chandra, B.Sc., *Forest Research Institute, Dehra Dun, U.P., India.*
1897 ‡ Chawner, Miss Ethel F., *Forest Bank, Lyndhurst S.O., Hants.*
1913 ‡ Cheavin, Capt. W. H. S., F.C.S., F.R.M.S., F.N.P.S., Demonstrator, Chemistry Dept., Middlesex Medical College, *Middlesex Hospital Medical School*, W. 1.
1919 Cheesman, Miss L. Evelyn, *Entomological Dept., Zoological Society, Regent's Park*, N.W. 8.
1920 ‡ Cheetham, Christopher Arthington, *Wheatfield, Old Farnley, Leeds.* All communications to *Stone Bridge Mills, Wortley, Leeds.*
1889 Christy, William M., M.A., F.L.S., *Watergate, Emsworth.*
1914 Chrystal, R. Neil, B.Sc., 4, *Branstone-road, Kew, Surrey.*
1909 Clark, Lt.-Col. C. Turner, F.Z.S., *Hillcrest, St. Augustine's-avenue, S. Croydon.*
1914 Cleare, L. D., *Dept. of Science and Agriculture, Georgetown, British Guiana.*
1914 Cleghorn, Miss Maude Lina West, F.L.S., 12, *Alipore-road, Calcutta, India.*
1922 Clutten, Wm. George, 136, *Coal Clough-lane, Burnley.*
1908 Clutterbuck, Charles G., *Heathside*, 23, *Heathville-road, Gloucester.*
1908 Clutterbuck, P. H., Inspector General of Forests, *Simla, India.*
1904 ‡ Cockayne, Edward A., M.A., M.D., F.R.C.P. (Council, 1915–17), 116, *Westbourne-terrace*, W. 2.
1920 Cockcroft, T., 111, *Owen-street, Wellington South, New Zealand.*
1917 ‡ Cockerell, Prof. T. D. A., *University of Colorado, Boulder, Colorado, U.S.A.*
1917 ‡ Cocks, Frederick, 26, *Crown-street, Reading.*
1914 Coleman, Leslie C., Dept. of Agriculture, *Bangalore, Mysore, India.*
1922 Collenette, C. L., *Gothic Lodge, Woodford Green, Essex.*
1899 ‡ Collin, James E. (V.-Pres., 1913; Council, 1904–6, 1913–15, 1922–), *Sussex Lodge, Newmarket.*
1918 Comstock, Dr. John Adams, the Director, South-Western Museum, *Marmion-way and Avenue, Los Angeles, California, U.S.A.*
1913 ‡ Coney, Miss Blanche A., *Brampton Hall, Wangford, Suffolk.*
1919 ‡ Constable, Miss Florence B., 17, *Colville Mansions*, W. 11.
1921 Coote, F. D., 11, *Pendle-road, Streatham*, S.W.
1916 Cornford, The Rev. Bruce, 13, *Havelock-road, Portsmouth.*

1921 Corporaal, J. B., *c/o Zoological Society, "Natura Artis Magistra," Amsterdam, Holland.*
1920 ‡ Cotterell, G. S., *Newlyn, Gerrard's Cross, Bucks.*
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1909 ‡ Crawley, W. C., B.A., F.R.M.S. (Council, 1917–19), 29, *Holland Park-road,* W. 14.
1890 Crewe, Sir Vauncey Harpur, Bart., *Calke Abbey, Derbyshire.*
1907 ‡ Croft, Edward Octavius, M.D., 12, *North Hill-road, Headingley, Leeds.*
1919 ‡ Cumming, Bernard Douglas, *Whistman's Wood, West Clandon, Surrey.*
1908 Curtis, W. Parkinson, *Drake North, Sandringham-road, Parkstone, Dorset.*

1900 Dalglish, Andrew Adie, 7, *Keir-street, Pollokshields, Glasgow.*
1886 ‡ Dannatt, Walter, F.Z.S., *St. Lawrence, Guibal-road, Lee,* S.E.
1922 Daubenay, R. T., B.A., *Herne Vicarage, Herne, Kent.*
1911 Davey, H. W., *Cobungra,* 19, *Moama-road, E. Malvern, Australia.*
1913 Davidson, James, D.Sc., F.L.S. (Council, 1922–), *Institute of Plant Pathology, Rothamsted, Harpenden, Herts.*
1905 Davidson, James, 32, *Drumsheugh Gardens, Edinburgh.*
1912 Davis, Frederick Lionel, J.P., M.R.C.S., L.R.C.P., *Corozal, British Honduras.*
1910 ‡ Dawson, William George, *Shortlands House, Shortlands, Kent.*
1903 Day, F. H., 26, *Currock-terrace, Carlisle.*
1898 Day, G. O., *Sahlatston, Duncan's Station, Vancouver Island, British Columbia.*
1917 ‡ Dickshee, Arthur, 24, *Lyford-rd., Wandsworth Common,* S.W. 18.
1887 ‡ Dixey, Frederick Augustus, M.A., M.D., F.R.S., Fellow and Bursar of Wadham College (Pres., 1909–10; V.-Pres., 1904–5, 1911; Council, 1895, 1904–6), *Wadham College, Oxford.*
1921 Dobson, H. W., 14, *Finkle-street, Kendal.*
1909 † Dobson, Thomas, 33, *The Park, Sharples, Bolton.*
1905 Dodd, Frederick P., *Kuranda, viâ Cairns, Queensland.*
1912 ‡ Doig, Major Kenneth Alan Crawford, R.A.M.C., M.R.C.S., L.R.C.P., 3, *Hook Heath, Woking.*
1891 ‡ Donisthorpe, Horace St. John K., F.Z.S. (V.-Pres., 1911; Council, 1899–1901, 1910–12), *Durandesthorpe,* 19, *Hazlewell-road, Putney,* S.W. 15.
1921 Dover, C., *c/o A. R. W. Gabriel, Esq.,* 24 *Montgomery-street, Edinburgh.*
1913 ‡ Dow, Walter James, 5, *Great College-street, Westminster,* S.W. 1.

1910 Downes-Shaw, Rev. Archibald, *Scotton Rectory, Gainsborough.*

1884*‡Druce, Hamilton H. C. J., F.Z.S. (Council, 1903–5), 26, *South Hill Park, Hampstead*, N.W. 3.

1900 Drury, W. D., *Dorset House, St. Tobias-road, Sevenoaks.*

1921 du Porte, E. M., *Macdonald College, Quebec, Canada.*

1894 Dudgeon, G. C., 1, *Zetland House, Cheniston-gardens, Kensington*, W.8.

1913 Duffield, Charles Alban William, *Stowting Rectory, Hythe*, and *Wye College, Kent.*

1906 ‡ Dukinfield Jones, E., 118, *Fairview-avenue, Glendale, California, U.S.A.*

1883 ‡ Durrant, John Hartley (V.-Pres., 1912–13; Council, 1911–13, 1919–21), *Merton*, 17, *Burstock-road, Putney*, S.W. 15; and *British Museum (Natural History), Cromwell-road, S. Kensington*, S.W. 7.

1910 ‡ Eales-White, Capt. J. Cushny, 49, *Chester-terrace, Eaton-square*, S.W. 1.

1912 ‡ Earl, Herbert L., M.A., *Vanessa, Rawlyn-road, Torquay.*

1922 Eastwood, John E., *Wade Court, Havant, Hants.*

1865 ‡ Eaton, The Rev. Alfred Edwin, M.A. (Council, 1877–9), *Richmond Villa, Northam S.O., N. Devon.*

1902 ‡ Edelsten, Hubert M., *Oakhurst, Balcombe-road, Haywards Heath, Sussex.*

1919 Edwardes, Capt. Tickner, R.A.M.C., *The Red Cottage, Burpham, Arundel, Sussex.*

1911 ‡ Edwards, F. W., 56, *Norton-road, Letchworth.*

1886 Edwards, James, *Colesborne, S.O., Glos.*

1884 ‡ Edwards, Stanley, F.L.S., F.Z.S. (Council, 1912–14), 15, *St. Germans-place, Blackheath*, S.E. 3.

1913 Edwards, William H., *Natural History Dept., The Museum, Birmingham.*

1916 ‡ Efflatoun, Bey Hassan, 38, *Shoubrah-avenue, Cairo, Egypt.*

1900 ‡ Elliott, E. A., 41, *Chapel Park-road, St. Leonards-on-Sea.*

1900 ‡ Ellis, H. Willoughby, F.Z.S. (Council, 1916–18, 1922–), 3, *Lancaster-place, Belsize Park*, N.W. 3.

1919 Elston, Albert H., 69, *Lefevre Terrace, N. Adelaide, S. Australia.*

1903 ‡ Eltringham, Harry, M.A., D.Sc., F.Z.S. (Secretary, 1922– ; V.-Pres., 1914, 1918; Council, 1913–15, 1918–20), *Woodhouse, Stroud, Gloucestershire*, and *Hope Department, University Museum, Oxford.*

1878 * Elwes, Henry John, J.P., F.R.S., F.L.S., F.Z.S. (Pres., 1893–4; V.-Pres., 1889–90, 1892, 1895; Council, 1888–90), *Colesborne, Cheltenham.*

1903 Etheridge, Robert, *Curator, Australian Museum, Sydney, N.S.W.*

1908 Eustace, Eustace Mallabone, M.A., *Wellington College, Berks.*

1922 Evans, H. Silvester, M.R.C.S., L.R.C.P., *Lomaloma, Fiji.*

1919 Evans, Lt.-Col. Wm. Harry, D.S.O., R.E., c/o Messrs. Cox & Co., 16, *Charing Cross*, W.C. 2, and *H.Q. Northern Command, Murree, Punjab, India.*

1919 Falconer, William, *Wilberlee, Slaithwaite, Huddersfield.*
1907 Feather, Walter, *Cross Hills, nr. Keighley, Yorks.*
1900 ‡ Feltham, H. L. L., *Mercantile Buildings, Summonds-street, Johannesburg, Transvaal.*
1861 ‡ Fenn, Charles, *Erersden House, Burnt Ash Hill, Lee,* S.E. 12.
1920 Fenton, Edward Wyllie, M.A., B.Sc., *Seale-Hayne Agricultural College, Newton Abbot, Devon.*
1918 ‡ Ferguson, Anderson, 22, *Polwarth-gardens, Glasgow, W.*
1922 Fernald, H.T., Ph.D., *Mass. Agricultural Coll., Amherst, Mass., U.S.A.*
1900 Firth, J. Digby, F.L.S., *Boys' Modern School, Leeds.*
1898 ‡ Fletcher, Prof. T. Bainbrigge, R.N., *Agricultural Research Institute, Pusa, Bihar, India.*
1883 † Fletcher, William Holland B., M.A., *Aldwick Manor, Bognor.*
1905 Floersheim, Cecil, 16, *Kensington Court Mansions,* S.W. 8.
1922 Flower, Miss A. B., "*Eastbury,*" *Surrey-road, Bournemouth West.*
1885 Fokker, A. J. F., *Zierikzee, Zeeland, Netherlands.*
1914 Fordham, William John, M.R.C.S., L.R.C.P., D.Ph., 7, *Rosslyn Avenue, Low Fell, Gateshead.*
1913 Foster, Arthur H., M.R.C.S., L.R.C.P.(Eng.), M.B.O.U., *Sussex House, Hitchin, Herts.*
1900 Foulkes, P. Hedworth, B.Sc., *Harper-Adams Agricultural College, Newport, Salop.*
1898 ‡ Fountaine, Miss Margaret E., 126, *Lexham Gardens,* W. 8.
1880 ‡ Fowler, The Rev. Canon, D.Sc., M.A., F.L.S. (Pres., 1901–2; V.-Pres., 1903; Sec., 1886–96), *Earley Vicarage, near Reading.*
1921 Fox, C. L., 1621, *Vallejo Street, San Francisco, California, U.S.A.*
1920 ‡ Fox-Wilson, G., *Entomological Dept., R.H.S. Laboratory, Wisley, Ripley, Surrey.*
1908 Fraser, Frederick C., Capt., M.D., I.M.S., 309, *Brownhill-road, Catford, S.E.*
1888 ‡ Fremlin, H. Stuart, M.R.C.S., L.R.C.P., *White House Farm, Bedmond, by King's Langley, Herts.*
1921 Frew, J. G. H., 262, *Church-road, Yardley, Birmingham.*
1910 ‡ Frisby, G. E., 31, *Darnley-road, Gravesend.*
1908 Froggatt, Walter W., F.L.S., Government Entomologist, *Agricultural Museum, George-street North, Sydney, New South Wales.*
1891 Frohawk, F. W., *c/o Dr. A. G. Butler, F.L.S., F.Z.S.,* 124, *Beckenham-road, Beckenham, Kent.*
1907 ‡ Fryer, John Claud Fortescue, M.A. (Council, 1916–18), *Milton-road, Harpenden, Herts.*
1876 ‡ Fuller, The Rev. Alfred, M.A., *The Lodge,* 7, *Sydenham-hill, Sydenham,* S.E. 26.

1887 ‡ Gahan, Charles Joseph, M.A., D.Sc. (Pres., 1917–18; V.-Pres., 1916, 1919; Sec., 1899–1900; Council, 1893–5, 1901, 1914–16, 1919), 8, *Lonsdale-road, Bedford Park,* W. 4; and *British Museum (Natural History), Cromwell-road,* S.W. 7.

1920 Gardner, J. C. M., *Entomological Dept., Royal College of Science, S. Kensington*, S.W. 7.

1901†‡Gardner, Willoughby, F.L.S., F.S.A., *Deganwy, N. Wales.*

1922 Gater, B. A. R., B.A., F.R.M.S., 40, *Overstrand Mansions, Prince of Wales-road, Battersea Park*, S.W.

1920 Gauntlett, Harry Leon, F.Z.S., M.R.C.S., L.R.C.P., A.K.C., *Formby, Brockenhurst, Hants.*

1913 ‡ de Gaye, J. A., *P.O. Box* 413, *Lagos, S. Nigeria.*

1919 ‡ Gedye, Alfred Francis John, *P.O. Box* 2194, *Cape Town, South Africa.*

1899*‡Geldart, William Martin, M.A., 10, *Chadlington-road, Oxford.*

1922 Ghosh, C. C., B.A., *Agricultural College, Mandalay, Burma, India.*

1913*‡Gibb, Lachlan, 38, *Blackheath Park, Blackheath*, S.E. 3.

1915 Gibson, Arthur, *Entomological Branch, Dept. of Agriculture, Ottawa, Canada.*

1908 Giffard, Walter M., *P.O. Box* 308, *Honolulu, Hawaii.*

1895 Gilbert-Carter, Sir G. T., K.C.M.G., *c/o Cox & Co.*, 43, *Charing Cross*, S.W.

1907 Giles, Henry Murray, Head Keeper of Zoological Gardens, *South Perth, W. Australia.*

1904 ‡ Gilliat, Francis, B.A., *Windham Club, St. James's-square, Piccadilly*, S.W. 1.

1919 Gimingham, Conrad Theodore, O.B.E., F.I.C., *The Cottage, Offchurch*, nr. *Leamington Spa.*

1921 Glick, P. A., *Arizona Commission of Agriculture and Horticulture, Phoenix, Arizona, U.S.A.*

1914 ‡ Godfrey, E. J., Education Dept., *Bangkok, Siam.*

1920 ‡ Goodban, Bernard Sinclair, *The Vicarage, Ewell, Surrey.*

1921 ‡ Goodman, O. R., 210, *Goswell-road*, E.C. 1.

1904 Goodwin, Edward, *Canon Court, Wateringbury, Kent.*

1898 ‡ Gordon, J. G. McH., *Corsemalzie, Whauphill S.O., Wigtownshire.*

1898 ‡ Gordon, R. S. G. McH., *Dramblair, Inverness.*

1913 Gough, Lewis, Ph.D., Entomologist to the Govt. of Egypt, *Dept. of Agriculture, Cairo.*

1909 Gowdey, Carlton C., B.Sc., *Hope, Kingston P.O., Jamaica.* Transactions to 116, *Pleasant-street, Amherst, Mass., U.S.A.*

1918 Grace, George, B.Sc., A.R.C.Sc., 23, *Alexander-crescent, Ilkley, Yorks.*

1914 Graveley, F. H., *The Indian Museum, Calcutta.*

1911 ‡ Graves, Major P. P., *c/o "The Times," Printing House Square*, E.C. 4.

1891 †‡Green, E. Ernest, F.Z.S. (V.-Pres., 1915; Council, 1914–16), *Way's End, Beech-avenue, Camberley.*

1894 Green, J. F., F.Z.S., 49, *Draycott-place*, S.W. 3.

1922 Greening, Linnaeus, F.L.S., F.Z.S., M.A.O.U., 33, *Wilson Patten-street, Warrington.*

1893 † Greenwood, Henry Powys, F.L.S., *Whitsbury House, Salisbury.*
1921 Greenwood, W. F. N., *C.S.R. Co., Lautoka, Fiji.*
1920 Griffin, J. W., 27, *The Summit, Liscard, Wallasey.*
1888 Griffiths, G. C., F.Z.S., *Penhurst, 3, Leigh-road, Clifton, Bristol.*
1894 ‡ Grimshaw, Percy H., *Royal Scottish Museum, Edinburgh.*
1905 Grist, Charles J., *The Croft, Carol Green, Berkswill, Coventry.*
1920 ‡ Grosvenor, T. H. L., *Walldeanes, Redhill, Surrey.*
1920 ‡ Gunton, Major H. C., *Seaton Cottage, Gerrard's Cross Common, Bucks.*
1906 Gurney, Gerard H., *Keswick Hall, Norwich.*
1910 Gurney, William B., Asst. Govt. Entomologist, *Department of Agriculture, Sydney, Australia.*

1912 Hacker, Henry, *Queensland Museum, Brisbane, Queensland.*
1919 Hadwen, Dr. Seymour, D.Vet.Sci., *Biological Central Experimental Farm, Ottawa, Canada.*
1906 ‡ Hall, Arthur, 7, *Park-lane-mansions, Croydon.*
1890 †‡ Hall, Albert Ernest, c/o *City Librarian, Surrey-street, Sheffield.*
1885 ‡ Hall, Thomas William, *Wood Grange, Shire-lane, Chorley Wood, Herts.*
1921 Hall, W. J., Entomologist, *Ministry of Agriculture, Cairo, Egypt.*
1912 Hallett, Howard Mountjoy, 64, *Westbourne-road, Penarth, Glamorganshire.*
1915 Hamm, Albert Harry, 22, *Southfield-road, Oxford.*
1891 ‡ Hanbury, Frederick J., F.L.S., *Brockhurst, E. Grinstead.*
1905 † Hancock, Joseph L., 5454, *University-avenue. Chicago, U.S.A.*
1917 Harding, William G., F.L.S., M.R.S.L., F.R.H.S., *St. George's School, Windsor.*
1920 Hardy, Alister Clavering, 40, *Harlow Moor-drive, Harrogate.*
1903 ‡ Hare, E. J., 4, *New-square, Lincoln's Inn,* W.C. 2.
1920 ‡ Hargreaves, Ernest, *Entomological Section, Ministry of Agriculture, Cairo, Egypt.*
1920 Hargreaves, Harry, *Biological Laboratory, Kampala, Uganda.*
1921 Harland, S. C., D.Sc., *Shirley Institute, Didsbury, near Manchester.*
1910 ‡ Harwood, Philip, 2, *Westbury Terrace, Westerham, Kent.*
1919 ‡ Hawker-Smith, William, *Speedwell Cottage, Hambledon, Godalming, Surrey.*
1913 †‡ Hawkshaw, Oliver, 3, *Hill-street, Mayfair,* W. 1.
1919 ‡ Hayward, H. C., M.A., *Repton, Derby.*
1921 Hayward, Capt. K. J., *The Vicarage, Bruton, Somerset.*
1910 ‡ van der Hedges, Alfred, *Mayneshill, Hoggeston, Winslow, Bucks.*
1919 ‡ Hemming, Arthur Francis, 9, *Victoria-grove,* W. 8, and *Treasury Chambers, Whitehall,* S.W. 1.
1910 Henderson, J., *c/o Messrs. Osborne & Chappel, Ipoh, Perak, Federated Malay States.*
1918 Herrod-Hempsall, Joseph, *Orchard House, Stockingstone-road, Luton, Beds.*

1903 Herrod-Hempsall, William, *W.B.C. Apiary, Old Bedford-road, Luton, Beds.*
1913 Hewitt, John, B.A., Director, *Albany Museum, Grahamstown, S. Africa.*
1922 Higgins, L. G., M.A., F.R.C.S., *Heatherside, Woking, Surrey.*
1907 ‡ Hoar, Thomas Frank Partridge, *Hillside, Verulam-road, St. Albans, Herts.*
1917 Hockin, John W., *Castle-street, Launceston.*
1920 Hodge, Albert Ernest, F.Z.S., 14, *Astonville-street, Southfields,* S.W. 18.
1914 Hodge, The Rev. Canon Edward Grose, *The Rectory, Birmingham.*
1912 Hodge, Harold, 99, *Highbury-place,* N. 5.
1888 Hodson, The Rev. J. H., B.A., B.D., *Rhyddington, Clifton Drive, Lytham.*
1902 Hole, R. S., *c/o Messrs. King and Co., Bombay.*
1910 Holford, H. O., *Elstead Lodge, Godalming, Surrey.*
1887 Holland, The Rev. W. J., D.D., Ph.D., *Carnegie Museum, Pittsburgh, Penn., U.S.A.*
1898 Holman-Hunt, C. B., F.Z.S., *Royal Society's Club, St. James'-street,* S.W.
1910 ‡ Holmes, Edward Morrell, *Ruthven, Sevenoaks.*
1921 Hope, H. Donald, 76, *Jermyn-street,* S.W. 1.
1922 Hopkins, G. H. E., *Downing College, Cambridge.*
1921 Hopper, L. B., *Manor House, Penryn, Cornwall.*
1901 ‡ Hopson, Montagu F., L.D.S., R.C.S.Eng., F.L.S., 7, *Harley-street,* W. 1.
1897 * Horne, Arthur, *Bonn-na-coile, Murtle, Aberdeenshire.*
1919 de Horrack-Fournier, Mme., 90, *Boulevard Malesherbes, Paris,* and *Château de Voisins, Louveciennes, Seine et Oise, France.*
1907 † Howard, C. W., *Canton Christian College, Canton, China.*
1900 Howes, W. George, 259, *Cumberland-street, Dunedin, New Zealand.*
1888 Hudson, George Vernon, *Hill View, Karori, Wellington, New Zealand.*
1907 Hughes, C. N., 178, *Clarence Gate-gardens, Regent's Park,* N.W. 1.
1921 Hunt, Rev. T. Wesley, 116, *Cross-street, Kroonstadt, Orange Free State.*
1917 Hunter, David, M.A., M.B., *The Coppice, Nottingham.*
1922 Hutchinson, G. E., *Aysthorpe, Newton-road, Cambridge.*

1897 ‡ Image, Prof. Selwyn, M.A. (Council, 1909–11), 78, *Parkhurst-road, Camden-road,* N. 7.
1912†‡Imms, A. D., D.Sc., M.A., F.L.S. (Vice-President, 1920 ; Council, 1919–21), *Rothamsted Experimental Station, Harpenden, Herts.*
1920 Inglis, Charles McFarlane, F.Z.S., M.B.O.U., *Baghownie Factory, Laheria Sarai, Bihar, India.*
1918 Isaacs, P. V., 2, *Gledhill-terrace, South Kensington,* S.W. 5.

1907 Jack, Rupert Wellstood, Government Entomologist, Department of Agriculture, *Salisbury, Rhodesia.*

1917 ‡ Jackson, Miss Dorothy J., *Swordale, Evanton, Ross-shire.*

1907 ‡ Jackson, P. H., *Ellesmere, The Drive, Sevenoaks.*

1922 Jackson, W. H., 14, *Woodcote Valley-road, Purley, Surrey.*

1911 ‡ Jacobs, Major J. J., R.E., *Holmesleigh, Burgess Hill, Sussex.*

1920 James, Russell, 7, *Broadlands-road, Highgate,* N. 6.

1914 ‡ Janse, A. J. T., 1*st-street, Gezina, Pretoria, S. Africa.*

1869 ‡ Janson, Oliver E., 44, *Great Russell-street, Bloomsbury,* W.C. 1 ; and *Cestria, Claremont-road, Highgate,* N. 6.

1898 Janson, Oliver J., 13, *Fairfax-road, Hornsey, N.*

1919 ‡ Jeans, Miss Gertrude M., *Penn Court,* 54, *Cromwell-road,* S.W. 7.

1886 Jenner, James Herbert Augustus, *East Gate House, Lewes.*

1909 Jepson, Frank P., *Peradeniya, Ceylon.*

1917 ‡ Jermyn, Col. Turenne, *Highcliffe, Weston-super-Mare.*

1886 John, Evan, *Llantrisant S.O., Glamorganshire.*

1907 Johnson, Charles Fielding, *West Bank, Didsbury-road, Heaton Mersey.*

1917 Johnson, Jesse, *Finca las Marias, Barberena, Guatemala.*

1889 Johnson, The Rev. W. F., M.A., 4, *Killowen Terrace, Rostrevor, co. Down.*

1920 ‡ Johnstone, Douglas, *Brooklands, Rayleigh, Essex.*

1908 ‡ Joicey, James J., F.L.S., F.Z.S., F.R.G.S., etc. (Council, 1921–), *The Hill, Witley, Surrey.*

1888 ‡ Jones, Albert H. (V.-Pres., 1912, 1918; Treas.,1904–17 ; Council, 1898–1900, 1918), *Church Gate House, Wadhurst, Sussex.*

1920 ‡ Jones, Rev. Neville, *Hope Fountain, Box* 283, *Buluwayo, Rhodesia, S. Africa.*

1894†‡Jordan, Dr. K., F.R.S. (V.-Pres., 1909 ; Council, 1909–11), *The Museum, Tring.*

1910 ‡ Joseph, E. G., 23, *Clanricarde-gardens,* W. 2.

1910 ‡ Joy, Ernest Cooper, *Eversley, Dale-road, Purley.*

1902 ‡ Joy, Norman H., M.R.C.S., L.R.C.P., *Theale, Berks.*

1919 Jurriaanse, J. H., *W.Z. Schickade,* 75, *Rotterdam, Holland.*

1911 Kannan, Kunhi, M.A., Asst. Entomologist to the Govt. of Mysore, *Bangalore, South India.*

1896†‡Kaye, William James (Council, 1906–8), *Caracas, Ditton Hill, Surbiton.*

1890 ‡ Kenrick, Sir George H., *Whetstone, Somerset-road, Edgbaston, Birmingham.*

1920 Kent-Lemon, Capt. Arthur Leslie, York & Lancaster Regt., *c/o Postmaster, Khartoum, Sudan,* and *Blytheswood, Ascot, Berks.*

1904 Kershaw, G. Bertram, *Ingleside, West Wickham, Kent.*

1906 Keynes, John Neville, M.A., D.Sc., 6, *Harvey-road, Cambridge.*

1900 Keys, James H., 7, *Whimple-street, Plymouth.*

1919 KHARE, Jagamath Laxman, *Agricultural College, Nagpur, India.*
1912 ‡ KING, Harold H., Govt. Entomologist, *Gordon College, Khartoum, Sudan.*
1889 KING, James J. F.-X., 1, *Athole Gardens-terrace, Kelvinside, Glasgow.*
1913 KIRBY, W. Egmont, M.D., *Hilden*, 46, *Sutton Court-road, Chiswick*, W. 4.
1917 ‡ KIRKPATRICK, Thos. W., *The Deanery, Ely*, and *Room* 270, *War Office, Whitehall*, S.W. 1.
1887 † KLEIN, Sydney T., F.L.S., F.R.A.S., *Lancaster Lodge, Kew Gardens, Surrey.*
1920 KNIGHT, V., *Fairgreen Cottage, Glemsford, Suffolk.*

1922 LACEY, Lionel, *Churchfields, Rodborough, Stroud, Glos.*
1916 ‡ LAING, Frederick (COUNCIL, 1922–), *Natural History Museum, Cromwell-road*, S.W. 7.
1910 ‡ LAKIN, C. Ernest, M.D., F.R.C.S., 105, *Harley-street*, W. 1.
1911†‡LAMBORN, W. A., M.R.C.S., L.R.C.P., *Littlemore, nr. Oxford.*
1921 ‡ LANCUM, F. H., *Fernside, Shepherd's Lane, Dartford, Kent.*
1917 LANGHAM, Sir Charles, Bart., *Tempo Manor, Co. Fermanagh.*
1922 LANKESTER, C. H., *Cartago, Costa Rica.*
1920 LATHY, Percy I., 90, *Boulevard Malesherbes*, and 70, *Boulevard August Blaqui, Paris.*
1916 LATTA, Prof. Robert, D.Phil., *University of Glasgow.*
1895 LATTER, Oswald H., M.A., *Charterhouse, Godalming.*
1899 LEA, Arthur M., Government Entomologist, *Museum, Adelaide, S. Australia.*
1914 LEECHMAN, Alleyne, M.A., F.L.S., F.C.S., *Amani*, near *Tanga, Tanganyika Territory, East Africa.*
1910 LEIGH, H. S., *The University, Manchester.*
1900 LEIGH-PHILLIPS, Rev. W. J., *Burtle Vicarage, Bridgwater.*
1920 ‡ LEMAN, George Beddome Curtis, *Wynyard*, 52, *West Hill, Putney Heath*, S.W. 15.
1920 ‡ LEMAN, George Curtis, *Wynyard*, 52, *West Hill, Putney Heath*, S.W. 15.
1920 ‡ LEMAN, Sydney Curtis, *Wynyard*, 52, *West Hill, Putney Heath*, S.W. 15.
1903†‡LEVETT, The Rev. Thomas Prinsep, *Frenchgate, Richmond, Yorks.*
1876 ‡ LEWIS, George, F.L.S. (COUNCIL, 1878, 1884), 30, *Shorncliffe-road, Folkestone.*
1908 † LEWIS, John Spedan, *High Combe, Balcombe, Surrey;* and 277, *Oxford-street*, W. 1.
1922 LIGHT, S. S., *Redcot, Linton-road, Hastings.*
1892 * LIGHTFOOT, R. M., *South African Museum, Cape Town, Cape of Good Hope.*
1914 ‡ LISTER, J. J., *St. John's College, Cambridge;* and *Merton House, Grantchester, Cambs.*

1903 * Littler, Frank M., *Box* 114, *P.O., Launceston, Tasmania.*
1865 † Llewelyn, Sir John Talbot Dillwyn, Bart., M.A., F.L.S., *Penllergare, Swansea.*
1881 † Lloyd, Alfred, F.C.S., *The Dome, Bognor.*
1919 ‡ Lloyd, Llewellyn, D.Sc., *Slingsby, Malton, Yorks.*
1885 †‡ Lloyd, Robert Wylie (Council, 1900–1), I, 5 and 6, *Albany, Piccadilly*, W. 1.
1920 ‡ Lodge, George, *Hawkhouse Park-road, Camberley.*
1903 Lofthouse, Thomas Ashton, *The Croft, Linthorpe, Middlesbrough.*
1908 ‡ Longsdon, D., *The Flower House, Southend, Catford*, S.E. 6.
1920 Loveridge, Arthur, *c/o Game Dept., Dar-es-Salaam, Tanganyika Territory.*
1893 Lower, Oswald B., *Broken Hill, New South Wales, Australia.*
1901 Lower, Rupert S., *Tranmere, Mayill-road, Canyton, S. Australia.*
1921 ‡ Lowes, E. D., *Home for Orphans, Swanley, Kent.*
1898 ‡ Lucas, William John, B.A. (Council, 1904–6), 28, *Knight's-park, Kingston-on-Thames.*
1903 Lyell, G., *Gisborne, Victoria, Australia.*
1912 ‡ Lyle, George Trevor, *Briarfield, Stump Cross, Shibden, Halifax.*
1909 Lyon, Francis Hamilton, *Silversundsvagen* 29, *Helsingfors-Brändö, Finland.*

1922 McConnell, Dr. R. E., *Arua, Uganda.*
1910 Macdougall, Professor R. Stewart, M.A., D.Sc., F.R.S.E., 9, *Dryden Place, Blacket Avenue, Edinburgh.*
1922 Mace, Herbert, *Faircotes, Harlow, Essex.*
1919 McLeod, Murdoch Campbell, *The Fairfields, Cobham, Surrey*, and *c/o McLeod & Son, Calcutta, India.*
1900 Mackwood, The Hon. F. M., M.L.C., *c/o Cotesworth & Powell, Ltd.*, 9, *Wood-street*, E.C. 2.
1899 †‡ Main, Hugh, B.Sc. (Council, 1908–10), *Almondale*, 55, *Buckingham-road, South Woodford*, N.E.
1905 Mally, Charles William., M.Sc., *Dept. of Agriculture, Cape Town, S. Africa.*
1892 ‡ Mansbridge, William, *Dunraven, Church-road, Wavertree, Liverpool.*
1919 Mansfield-Aders, Dr. W., *Zanzibar.*
1920 Marriner, Thomas Frederic, 2, *Brunswick-street, Carlisle.*
1894 *†‡ Marshall, Alick.
1895 ‡ Marshall, Guy Anstruther Knox, C.M.G., D.Sc., F.Z.S. (V.-Pres., 1919; Council, 1907–8, 1919–21), 6, *Chester-place, Hyde Park-square*, W. 2.
1922 Marshall, J. F., M.A., F.Z.S., *Seacourt, Hayling Island, Hants.*
1896 Marshall, P., M.A., B.Sc., F.G.S., *University School of Mines, Dunedin, New Zealand.*
1897 Martineau, Alfred H., *Barum, Crewkerne, Somerset.*
1919 Marumo, N., *Zoological Institute, Agricultural College, Imperial University, Komaba, Tokyo, Japan.*

1922 Massee, A. M., *Park-place, The Common, Sevenoaks, Kent.*
1895 Massey, Herbert, *Ivy-Lea, Burnage, Didsbury, Manchester.*
1865 Mathew, Gervase F., F.L.S., Paymaster-in-chief, R.N. (Council, 1887), *Lee House, Dovercourt, Harwich.*
1921 Matsumura, Prof. S., *Hokkaido Imperial University, Sapporo, Japan.*
1887 Matthews, Coryndon, *Woodside, Salcombe, S. Devon.*
1912 Maulik, Prof. S., *Dept. of Zoology, University of Calcutta, Calcutta, India.*
1900 ‡ Maxwell-Lefroy, Professor H., *Imperial College of Science and Technology, South Kensington,* S.W.
1916 ‡ May, Harry Haden, *Kapai, Elburton, S. Devon.*
1913 ‡ Meaden, Louis, *Melbourne, Dyke-road, Preston, Brighton.*
1920 ‡ Meldola, Mrs. Ella Frederica, 6, *Brunswick square,* W.C. 1.
1919 Mellows, Charles, M.A., *The College, Bishop's Stortford.*
1885 Melvill, James Cosmo, M.A., F.L.S., *Meole Brace Hall, Shrewsbury.*
1887 ‡ Merrifield Frederic (Pres., 1905–6 ; V.-Pres., 1893, 1907 ; Sec., 1897–8 ; Council, 1894, 1899), 14, *Clifton-terrace, Brighton.*
1912 Metcalfe, Rev. J. W., *St. Luke's House, Torquay.*
1880 ‡ Meyrick, Edward, B.A., F.R.S., F.Z.S., *Thornhanger, Marlborough.*
1919 Miles, Herbert William, N.D.A., *The Gardens, Lydney Park, Gloucester.*
1883 ‡ Miles, W. H., *c/o E. Step, Esq.,* 158, *Dora-road, Wimbledon Park,* S.W. 19.
1920 Miller, D., 71, *Fairlie Terrace, Kelburn, Wellington, New Zealand.*
1921 Miller, N. E., 90, *Alleyne-road, Dulwich,* S.E. 21.
1905 ‡ Mitford, Robert Sidney, C.B., 9, *Beaconsfield-terrace, Hythe, Kent.*
1902 ‡ Montgomery, Arthur Meadows, 34, *Shalimar Gardens, Acton,* W. 3.
1922 Moore, A., M.D., 31, *Alfred-place W., South Kensington,* S.W.
1922 Moore, A. E., *Brookside, Brent Mead-avenue, Golders Green,* N.W. 3.
1899 ‡ Moore, Harry, 12, *Lower-road, Rotherhithe,* S.E. 16.
1922 Moore, J. W., 151, *Middleton Hall-road, King's Norton, Birmingham.*
1916 * Moore, Ralph Headley, B.A., *Heathfield, Plymstock, Devon.*
1886 Morgan, A. C. F., F.L.S., 135, *Oakwood-court, Kensington,* W. 14.
1889 †‡ Morice, The Rev. F. D., M.A., F.Z.S., Fellow of Queen's College, Oxford (Pres., 1911–12 ; V.-Pres., 1902, 1904, 1913, 1919 ; Council, 1902–4, 1918–20), *Brunswick, Mount Hermon, Woking.*
1895 †‡ Morley, Claude, F.Z.S., *Monk Soham House, Suffolk.*
1920 Morris, Hubert Meridydd, M.Sc., *Institute of Plant Pathology, Rothamsted Experimental Station, Harpenden, Herts.*
1893 Morton, Kenneth J., 13, *Blackford-road, Edinburgh.*
1910 ‡ Mosely, Martin E., 94, *Campden Hill-road, Kensington,* W. 8.

1882 Mosley, S. L., *Ravensknowle Museum, Huddersfield.*
1911 ‡ Moss, Rev. A. Miles, *c/o Messrs. Booth & Co., Para, Brazil.*
1907†‡Moulton, John C., O.B.E., M.A., B.Sc., F.Z.S., &c., Director *Raffles Museum and Library, Singapore, Straits Settlements,* and *The Hall, Bradford-on-Avon.*
1911 Mounsey, J. Jackson, 24, *Glencairn-crescent, Edinburgh.*
1922 Moysey, Capt. Francis, *c/o Col. R. H. Rattray,* 68, *Dry Hill Park-road, Tonbridge, Kent.*
1901†‡Muir, Frederick, *H.S.P.A. Experiment Station, Honolulu, Oahu, H.I.*
1912 † Mullan, Jal Phirozshah, M.A., F.L.S., F.Z.S., Professor of Biology, *St. Xavier's College, Lamington-road, Grant Road Post, Bombay, India.*
1920 Munro, Hugh Kenneth, B.Sc., *P.O. Box* 16, *East London, South Africa.*
1918 Munro, James W., D.Sc., R.A.M.C., *Green Lawn, Kew-road, Richmond, Surrey.*
1914 Murray, George H., *The Residency, Kerema Gulf Division, Papua.*
1917 Muschamp, Percy A. H., 35, *Upperton-road, Leicester.*
1909 Musham, John F., 48, *Brook-street, Selby, Yorks.*
1920 Myers, J. G., 306, *Willis-street, Wellington, New Zealand.*

1921 Nair, K. P. U., *Training College, Trivandrum, India.*
1903 ‡ Neave, S. A., M.A., D.Sc., F.Z.S. (Secretary, 1919– ; V.-Pres., 1918 ; Council, 1916–18), 41, *Queen's Gate,* S.W. 7, and *Bishop's House, Beaconsfield, Bucks.*
1919 ‡ Nell, Louis, *Imperial Bureau of Entomology,* 41, *Queen's Gate,* S.W. 7.
1919 Nelson, William George Frazer (Council, 1922–), 6, *Bolton Street, Piccadilly,* W. 1.
1901 ‡ Nevinson, E. B., *Morland, Cobham, Surrey.*
1907 ‡ Newman, Leonard Woods, *Bexley, Kent.*
1913 Newman, Leslie John William, *Bernard-street, Claremont, W. Australia.*
1909 Newstead, Alfred, *The Grosvenor Museum, Chester.*
1890 ‡ Newstead, Prof. Robert, M.Sc., F.R.S., A.L.S., Hon. F.R.H.S., Dutton Memorial Professor of Entomology, *The School of Tropical Medicine, University of Liverpool.*
1921 Nicholson, A. J., *University of Sydney, New South Wales, Australia.*
1914 ‡ Nicholson, Charles, 35, *The Avenue, Hale-end, Chingford,* E. 4.
1909 ‡ Nicholson, Gilbert W., M.A., M.D. (Council, 1913–15), *Oxford and Cambridge Club, Pall Mall,* S.W. 1.
1918 ‡ Nimmy, Ernest William, 210, *Whippendell-road, Watford, Herts.*
1906 Nix, John Ashburner, *Tilgate, Crawley, Sussex.*
1914 Norris, Frederic de la Mare, *The Agricultural Department, Kuala Lumpur, Federated Malay States.*

1915 Northcote, Dr. A. B., 4, *Columbia-road, Bethnal Green*, E. 2.
1895 Nurse, Lt.-Colonel C. G., *Redcote, Rusthall Park, Tunbridge Wells.*

1877 Oberthür, René, *Rennes (Ille-et-Vilaine), France.*
1910 ‡ Oldaker, Francis A., M.A., *The Red House, Haslemere.*
1921 Ollenbach, O. C., *Survey of India Dept., Dehra Dun, India.*
1918 O'Neil, Rev. Fr., S.J., *P.O. Box* 54, *Salisbury, Rhodesia, South Africa.*
1913 ‡ Ormiston, Walter, *Kalupatrani, Haldummulle, Ceylon.*

1895 ‡ Page, Herbert E. (Council, 1918–20), *Bertrose, Gellatly-road, St. Catherine's Park*, S.E. 15.
1921 Pallis, M. A., *Tatoi, Aigburth Drive, Liverpool.*
1916 Palmer, Arthur Raymond, *Standford, Baldock-road, Letchworth, Herts.*
1919 Paravicini, Louis, *Commissioner de la Bourse de Bâle, Bâle, Switzerland.*
1918 Parris, R. Stanway, *The Gables, Sandhurst, Berks.*
1919 Patton, Major W. J., I.M.S., 34, *York-road, Trinity, Edinburgh.*
1922 Pearce, Miss E. K., *Kempston, Bournemouth West.*
1922 Pearce, Edmund J., *The Lodge, Corpus Christi College, Cambridge.*
1911 ‡ Pearson, Douglas, *Chilwell House, Chilwell, Notts.*
1916 ‡ Peebles, Howard M., 71, *Cadogan Gardens*, S.W. 3.
1919 Peed, John, *Aylesham, Norfolk.*
1915 ‡ Peile, Lt.-Col. Harry Diamond, I.M.S., c/o H. S. King & Co., 9, *Pall Mall*, S.W. 1. [Transactions to H. F. G. Watkins, 38, *Denbigh-road, West Ealing*, W. 13.]
1921 ‡ Pendlebury, H. M., *Broadlands, Shrewsbury*; Systematic Entomologist, *Federated Malay States.*
1914 ‡ Pendlebury, Major Wm. J. von Monté, *Broadlands, Shrewsbury*, and *Keble College, Oxford.*
1883 Péringuey, Louis, D.Sc., F.Z.S., Director, *South African Museum, Cape Town, South Africa.*
1922 Perkins, M. G. L., 4, *Dean's-yard, Westminster-abbey*, S.W. 1.
1903 † Perkins, R. C. L., M.A., D.Sc., F.Z.S., *Park Hill House, Paignton, Devon;* and Board of Agriculture, Division of Entomology, *Honolulu, Hawaii.*
1907 † Perrins, J. A. D., 3rd Seaforth Highlanders, *Davenham, Malvern.*
1897 ‡ Phillips, Capt. Hubert C., F.Z.S., M.R.C.S., L.S.A., 17, *Hereford-road, Bayswater*, W. 2.
1903†‡Phillips, Montagu A., F.R.G.S., F.Z.S., *Deronshire House, Preparatory School, Reigate.*
1920 Philpott, A., Assistant Entomologist, Biological Dept., *Cawthron Institute of Scientific Research, Nelson, New Zealand.*
1917 ‡ Pickard-Cambridge, Arthur D., M.A., *Balliol College, Oxford.*
1891 ‡ Pierce, Frank Nelson, *The Old Rectory, Warmington, Oundle, Northants.*
1913 Platt, Ernest Edward, 403, *Essenwood-road, Durban, Natal.*

1885 Poll, J. R. H. Neerwort van der, *c/o J. Stroere, B.Z. Prinsengracht*, 1005, *Amsterdam*.

1919 Pomeroy, Arthur W. Jobbins, Government Entomologist in Nigeria, *Ibadan, S. Nigeria*.

1870†‡Porritt, Geo. T., F.L.S. (Council, 1887), *Elm Lea, Dalton, Huddersfield*.

1884†‡Poulton, Professor Edward B., D.Sc., M.A., F.R.S., F.L.S., F.G.S., F.Z.S., Hope Professor of Zoology in the University of Oxford, (Pres., 1903–4; V.-Pres., 1894–5, 1902, 1905, 1922; Council, 1886–8, 1892, 1896, 1905–7, 1922–), *Wykeham House, Banbury-road, Oxford*.

1905 Powell, Harold, 7, *Rue Mireille, Hyères (Var), France*.

1921 Powniah, D., *Agricultural Dept., Kuala Lumpur, Federated Malay States*.

1919 Praed, Cyril Winthrop Mackworth, *Dalton Hill, Albury, Surrey*.

1908 ‡ Pratt, William B., 10, *Lion Gate Gardens, Richmond, Surrey*.

1878 Price, David, 12, *Worthing-road, Horsham*.

1922 Price, J., 165, *Corporation-street, Stafford*.

1908 ‡ Prideaux, Robert M. (Council, 1917), *Woodlands, Brasted Chart, Sevenoaks*.

1920 ‡ Prior, W. H. T., *Culban, Main-road, New Eltham, Kent*.

1904 ‡ Priske, Richard A. R., 9, *Melbourne Avenue, West Ealing*.

1920 Prout, Miss Alice Ellen, *Lane End, Hambledon, Surrey*.

1893 ‡ Prout, Louis Beethoven (Council, 1905–7), 84, *Albert-road, Dalston*, E. 8.

1910 Punnett, Professor Reginald Crundall, M.A., *Caius College, Cambridge*.

1922 Rae, Mrs. Margaret, *Courthill, Maidenhead, Berks*.

1912 ‡ Rait-Smith, W., *Birkby House, Bickley Park, Kent*.

1914 Ramakrishna, T. V. Ayyar, B.A., F.Z.S., *The Agricultural College, Coimbatore, S. India*.

1920 ‡ Rambousek, Dr. F. G., M.P., vii/1169, *Prague, Czechoslovakia*.

1913 Rao, K. Ananthaswamy, *Curator of the Government Museum, Bangalore, India*.

1916 Rao, Yelseti Ramachandra, M.A., *Agricultural College, Coimbatore, India*.

1920 Raymundo, Prof. Benedicto, Director of the Agricultural Society's Museum, 76, *rua Senador Alencar, Rio di Janeiro, Brazil*.

1907 ‡ Rayward, Arthur Leslie, *c/o T. N. Rayward, Esq., The Glen, Wraxall, nr. Bristol*.

1898 Reuter, Professor Enzio, *Helsingfors, Finland*.

1910 ‡ de Rhé-Philipe, G. W. V., Chief Examiner of Accounts, North-Western Ry., *Abbott-road, Lahore, India*.

1921 Rhodes, F., *Corporation Art Gallery and Museum, Cartwright Memorial Hall, Lister Park, Bradford*.

1920 ‡ Rhynehart, John George, A.R.C.Sc.I., N.D.A., *Ministry of Agriculture, Wellington Place, Belfast*.

1920 ‡ Richards, Philip Bernard, 7, *Churchways Crescent, Horfield, Bristol.*
1920 ‡ Richardson, Arthur Walter, 28, *Avenue-road, Southall, Middlesex.*
1922 Richardson, Rev. W. H., 32, *Wanderers Avenue, Wolverhampton.*
1921 Riddell, Miss J., Y.W.C.A., 251, *So. Hill-street, Los Angeles, California, U.S.A.*
1912 ‡ Riley, Capt. Norman Denbigh (Council, 1921–), 5, *Brook Gardens, Beverley-road, Barnes,* S.W. 13, and *British Museum (Natural History), S. Kensington,* S.W. 7.
1908 ‡ Rippon, Claude, M.A., 28, *Springfield House, Abingdon.*
1917 Roberts, A. W. Rymer, M.A., *Zoological Laboratory, The Museum, Cambridge.*
1905 Robinson, Herbert C., *Curator of State Museum, Kuala Lumpur, Selangor, Fed. Malay States.*
1904 ‡ Robinson, Lady, *Worksop Manor, Notts.*
1921 Roebuck, A., *Midland Agricultural and Dairy College, Sutton Bonnington, Loughborough.*
1908 ‡ Rogers, The Rev. Canon K. St. Aubyn, M.A., *Box* 395, *Nairobi, Kenya Colony, British East Africa.*
1922 Rosa, A. F., M.D., 28 *Pitt-street, Edinburgh.*
1907 ‡ Rosenberg, W. F. H., 57, *Haverstock-hill,* N.W. 3.
1868*‡Rothney, George Alexander James, *Pembury, Tudor-road, Upper Norwood,* S.E.
1888†‡Rothschild, The Right Hon. Lord, D.Sc., F.R.S., F.L.S., F.Z.S., President (Vice-President, 1920; Council, 1900, 1919), *Zoological Museum, Tring.*
1894†‡Rothschild, The Hon. Nathaniel Charles, M.A., F.L.S., F.Z.S. (Pres., 1915–16; V.-Pres., 1914, 1917; Council, 1904, 1913–17), *Arundel-house, Kensington Palace Gardens,* W. 8.
1890 ‡ Routledge, G. B., *Tarn Lodge, Heads Nook, Carlisle.*
1887*‡Rowland-Brown, Henry, M.A. (V.-Pres. 1908, 1910; Sec., 1900–10, 1921; Council, 1914–16, 1922–), *Oxhey-grove, Harrow Weald.*
1922 Russell, Frank, *Auldham House, Worksop.*
1892 ‡ Russell, S. G. C., *Roedean, The Avenue, Andover.*
1922 Ruston, A. H., *Aylesbury House, Chatteris, Cambs.*
1922 Ryle, G. B., *Pangbourne, Berks.*

1919 ‡ St. Aubyn, Capt. John G., c/o Sir Charles McGrigor & Co., 39, *Panton-street, Haymarket,* S.W. 1.
1920 St. John, W. St. A., M.R.C.S., L.R.C.P., *Derwent House, Derby.*
1906 Sampson, Colonel F. Winn, 115, *Tannsfield-road, Sydenham.*
1910 ‡ Saunders, H. A., *St. Ann's, Reigate.*
1920 Scharff, J. W., *Tampin, Federated Malay States.*
1901 Schaus, W., F.Z.S., *U.S. National Museum, Washington, D.C., U.S.A.,* 1737, *High-street, Washington, D.C.*
1920 Schlupp, W. F., B.Sc., *School of Agriculture & Experimental Station, Potchefstroom, Transvaal.*
1907 ‡ Schmassmann, W., *Beulah Lodge, London-road, Enfield,* N.

1912 Schunck, Charles A., *Ewelme, Wallingford.*
1911 ‡ Scorer, Alfred George, *Hill Crest, Chilworth, Guildford.*
1909 ‡ Scott, Hugh, M.A., D.Sc., Curator in Entomology, *University Museum of Zoology, Cambridge.*
1920 ‡ Seabrook, Lieut. J., 8, *West Warwick-place, Belgravia,* S.W. 1.
1911 Selous, Cuthbert F., M.D., M.R.C.S., L.R.C.P., 25, *Church-road, Tunbridge Wells.*
1911†‡Sennett, Noel Stanton, 24, *de Vere-gardens, Kensington,* W. 8.
1915 Shaw, Dr. A. Eland, c/o R. Kelly, Esq., Solicitor, 59, *Swanston-street, Melbourne, Victoria, Australia.*
1886 Shaw, George T. (Librarian of the Liverpool Free Public Library), *William Brown-street, Liverpool.*
1905 ‡ Sheldon, W. George, F.Z.S. (Treasurer, 1918– ; Vice-President, 1920), *West Watch, Limpsfield, Surrey.*
1900†‡Shepheard-Walwyn, H. W., M.A., *Dalwhinnie, Kenley, Surrey.*
1921 Shroff, K. D., *Kelapith,* 22, *Oxford Road, Putney, S.W.*
1887†‡Sich, Alfred (Council, 1910–12), *Corney House, Chiswick,* W. 4.
1911 ‡ Simes, James A., *Greenacres, Woodside-road, Woodford Green, Essex.*
1904 ‡ Simmonds, Hubert W., *Sussex View, Cumberland-gardens, Tunbridge Wells.*
1921 ‡ Simms, H. M., B.Sc., *The Farlands, Stourbridge.*
1920 ‡ Skaife, George Harold, M.A., *Inspector of Science, Department of Education, Cape Town, South Africa.*
1902*‡Sloper, Gerard Orby, F.Z.S., J.P., *Badminton Club, Piccadilly,* W. 1.
1922 Sloane, T. G., *Moorilla, Young, New South Wales, Australia.*
1907 ‡ Sly, Harold Baker, *Kingston, Homestead-road, Edenbridge, Kent.*
1906 ‡ Smallman, Raleigh S., *Eliot Lodge, Albemarle-road, Beckenham, Kent.*
1916 Smart, Major H. Douglas, M.D., B.S., *Shelley, Huddersfield.*
1920 ‡ Smee, C., 6, *Wildwood-road, Golders Green,* N.W. 4.
1915 ‡ Smith, Adam Charles, *Horton, Mornington-road, Woodford Green.*
1901 Smith, Arthur, *County Museum, Lincoln.*
1911 ‡ Smith, B. H., B.A., *Frant Court, Frant, Tunbridge Wells.*
1918 Smith, Patrick Aubrey Hugh, *Sconner House, St. German's, Cornwall.*
1912 ‡ Smith, Roland T., 131, *Queen's-road, Wimbledon,* S.W. 19.
1919 Smith, S. Gordon, F.L.S., *Estyn, Boughton, Cheshire.*
1918 † Smith, William Proctor, F.Z.S., *Haddon House, Ashton-on-Mersey.*
1885 ‡ South, Richard (Council, 1890–1), 4, *Mapesbury-court, Shoot-up Hill, Brondesbury,* N.W. 2.
1916 ‡ Sowerby, F. W., *Sea View, Little Haven, Pembrokeshire.*
1920 Spencer, John William, 5, *Dogford-road, Rayton, Oldham, Lancashire.*
1908 ‡ Speyer, Edward R., *Ridgehurst, Shenley, Herts.*
1919 ‡ Staniland, L. N., *Trewint, Coppett's-road, Muswell Hill,* N. 10.

1910 Stanley, The Rev. Hubert George, *Marshfield Vicarage, Cardiff.*
1919 Stansfield, Capt. Leslie Rawdon, R.G.A., *c/o Army and Navy Club, Pall Mall,* S.W. 1.
1910 ‡ Stenton, Rupert, *Ministry of Agriculture, Milton-road, Harpenden, Herts.*
1922 Stewart, B., *Lovell House, Leeds, Yorks.*
1920 Stidstone, Engineer-Commander S. T., R.N., *H.M.S. Woolwich, Devonport.*
1918 ‡ Stiff, Rev. Alfred T., *All Souls' Vicarage, Brighton.*
1910 ‡ Stoneham, Hugh Frederick, Capt., *4th Batt. The King's African Rifles, Bombo, Uganda, British East Africa.*
1913 * Storey, Gilbert, *Dept. of Agriculture, Cairo, Egypt.*
1915 ‡ Stott, Charles Ernest, *Eaton, London-road, Reigate.*
1896 ‡ Strickland, T. A. Gerald, *Southcott, Poulton, Fairford.*
1919 Susainathan, P., Assistant in Entomology, *College of Agriculture and Research Institute, Coimbatore, S. India.*
1884 Swinhoe, Colonel Charles, M.A., F.L.S., F.Z.S. (V.-Pres., 1894; Council, 1891–3; 1902–4), 4, *Gunterstone-road, West Kensington,* W. 14.
1876 ‡ Swinton, A. H., *Oak Villa, Braishfield, Romsey, Hants.*
1911 ‡ Swynnerton, C. F. M., *Kilosa, Tanganyika Territory.*
1920 ‡ Syms, Edgar E., 22, *Woodlands-avenue, Wanstead,* E. 11.

1910 Tait, Robt., junr., *Covertside, Moss Lane, Ashton-on-Mersey.*
1908 ‡ Talbot, G., *Mon Plaisir, Wormley, Surrey.*
1920 ‡ Tams, W. H., 19, *Sullivan Road, Hurlingham, S.W.* 6.
1918 Tapp, Capt. William Henry, F.R.A.S., F.R.G.S., 12, *Heddon-street, Regent-street,* W. 1.
1916 Tatchell, Leonard Spencer, 43, *Spratt Hall-road, Wanstead,* E. 11.
1911 Taylor, Frank H., *Box* 137, *G.P.O., Sydney, N.S.W.*
1903 Taylor, Thomas Harold, M.A., *Yorkshire College, Leeds.*
1914 Temperley, Reginald, *The Manor House, Merricott, Somerset.*
1919 ‡ Temple, Major Watkin, *East Mersea, Essex.*
1910 ‡ Theobald, Prof. F. V., M.A., *Wye Court, Wye, Kent.*
1901 Thompson, Matthew Lawson, 40, *Gosford-street, Middlesbrough.*
1892 Thornley, The Rev. A., M.A., F.L.S., *Hughenden, Coppice-road, Nottingham.*
1907 ‡ Tillyard, Robin John, M.A., D.Sc., F.L.S., Chief of the Biological Dept., *Cawthron Inst. of Scientific Research, Nelson, New Zealand,* and *Maitai Lodge, Bridge-street, Nelson, N.Z.*
1920 Tinsley, Joseph, *West of Scotland Agricultural College, Burns-avenue, Kilmarnock.*
1911 ‡ Todd, R. G., 54, *Hornsey-lane, Highgate,* N. 6.
1897 Tomlin, J. R. le B., M.A. (Council 1911–3), 23, *Boscobel-road, St. Leonards-on-Sea.*
1907 ‡ Tonge, Alfred Ernest (Council, 1915–17), *Aincroft, Reigate, Surrey.*
1920 Tonge, Alfred E., *Ashville, Trafford-road, Alderley Edge, Cheshire.*

1914 de la Torre Bueno, J. R., 11, *North Broadway, White Plains, New York, U.S.A.*
1911 ‡ Tower, P. H., 14, *Clifford-street, Bond-street,* W.
1922 Treherne, R. C., *Dept. of Agriculture, Ottawa, Canada.*
1919 Tullett, Austin Augustus, *The Hill Museum, Witley, Surrey.*
1906 ‡ Tulloch, Col. J. B. G., C.B., C.M.G., *c/o Cox & Co., Charing Cross,* S.W. 1.
1895 ‡ Tunaley, Henry, *Castleton, Searle-road, Farnham.*
1910 Turati, Conte Emilio, 4, *Piazza S. Alessandro, Milan, Italy.*
1898 ‡ Turner, A. J., M.D., *Wickham Terrace, Brisbane, Australia.*
1893 ‡ Turner, Henry Jerome (Librarian, 1921– ; Council, 1910–12), 98, *Drakefell-road, New Cross,* S.E. 14.
1906 ‡ Turner, Rowland E. (Council, 1909–10), *British Museum (Natural History), S. Kensington,* S.W. 7.
1921 Tutt, J. F. D., M.R.C.V.S., F.R.M.S., F.Z.S., F.L.S., 1, *St. Cross-road, Winchester, Hants.*
1915 Tytler, Brigadier-Gen. H. C., C.M.G., C.S.I., D.S.O., *Delhi, India.*

1893 ‡ Urich, Frederick William, C.M.Z.S., *Port of Spain, Trinidad, British West Indies.*
1920 ‡ Uvarov, B., *Natural History Museum, S. Kensington, S.W.* 7.

1922 Van Someren, V. G. L., C.M.Z.S., *Nairobi, Kenya Colony, British East Africa.*
1904†‡ Vaughan, W., *The Old Rectory, Beckington, Bath.*
1914 ‡ Veitch, Robert, B.Sc., Entomologist, c/o C.S.R. Co., *Lautoka Mills, Lautoka, Fiji Islands.*
1909 Vidler, Leopold A., *The Carmelite Stone House, Rye.*
1911 Vitalis de Salvaza, R., *chez Mme. G. Combe,* 10, *Rue d'Italie, Marseilles.*

1897 ‡ Wainwright, Colbran J. (Council, 1901, 1912–14), *Daylesford, Handsworth Wood, Birmingham.*
1918 Walford, Lionel Julian, *The Cavalry Club, Piccadilly,* W.
1878 ‡ Walker, James J., M.A., R.N., F.L.S. (President, 1919–20 ; V.-Pres., 1916, 1921 ; Sec., 1899, 1905–1918 ; Council, 1894, 1921), *Aorangi, Lonsdale-road, Summertown, Oxford.*
1921 Walker, S., 53, *Micklegate Hill, York.*
1912 Wallace, Henry S., c/o R. S. Bagnall & Sons, Ltd., 15, *Grey-street, Newcastle-on-Tyne.*
1920 Wallace, William, M.B., 15, *Hainton-avenue, Grimsby.*
1921 Wallis, H. H., M.A., *Rye Grammar School, Rye, Sussex.*
1914 Walsh, Mrs. Maria Ernestina, *Soekaboemi, Java, Dutch East Indies.*
1920 Walters, Owen Huth, *Forest Office, Lahore, India.*
1919 Ward, James Davis, *Limehurst, Grange-over-Sands, Lancs.*
1910 ‡ Ward, John J., *Rusinurbe House, Somerset-road, Coventry.*
1908 ‡ Warren, Brisbane C. S., *c/o Rev. G. Wheeler, c/o Miss Swaine, Briarfield, Guildford.*

1901 † Waterhouse, Gustavus Athol, B.Sc., B.E., *Allowrie, Stanhope-road, Killara, New South Wales, Australia.*

1914 ‡ Waterston, James, B.D., D.Sc. (Council, 1920–22), 21, *Arlington Park-mansions, Chiswick,* W. 4; and *British Museum (Natural History), S. Kensington,* S.W. 7.

1921 Watkinson, The Rev. G. M. A., *Woodfield, Hipperholme, near Halifax.*

1919 ‡ Watson, E. B., *The Grange, Winthorpe, Newark.*

1918 Watson, John Henry, 70, *Ashford-road, Withington, Manchester.*

1914 Watt, Morris N., *St. John's Hill, Wanganui, New Zealand.*

1906 ‡ Wheeler, The Rev. George, M.A., F.Z.S. (Secretary, 1911-21; V.-Pres., 1914; Council, 1921), *c/o Miss Swaine, Briarfield, Guildford.*

1910 ‡ White, Major Edward Barton, M.R.C.S., *Herrison, Dorchester.*

1918 White, Ronald Senior, *Suduganga Estate, Matale, Ceylon.*

1913†‡Whitley, Percival N., *Brantwood, Halifax*; and *New College, Oxford.*

1921 Whitney, W. B., B.Sc., A.M.Inst.C.E., *Glen Doone, Gerrards Cross, Bucks.*

1913 † Whittaker, Oscar, F.R.M.S., *Box* 552, *Chilliwack, British Columbia.*

1917 ‡ Wickham, Rev. Prebendary A. P., *East Brent Vicarage, Highbridge, Somerset.*

1906 Wickwar, Oswin S., *Gresham, Cambridge Place, Colombo, Ceylon.*

1903 ‡ Wiggins, Clare A., C.M.G., M.R.C.S., *The Folly, Watlington, Oxon.*

1896 ‡ Wileman, A. E., *Lane End, Westcott, nr. Dorking.*

1922 Wilkinson, Capt. D. S., *Kennington Vicarage, Ashford, Kent.*

1911 ‡ Williams, C. B., M.A., *Ministry of Agriculture, Cairo, Egypt,* and **20,** *Slatey-road, Birkenhead.*

1915 Williams, Harold Beck, *Briar Cottage, Vale-road, Claygate, Surrey.*

1921 Willmer, E. Nevill, *Trafford Hall, near Chester.*

1921 ‡ Wilson, H. I., O.B.E., M.A., F.Z.S., 139, *Bishop's Mansions, Fulham,* S.W. 6.

1919 † Wilson, Lt.-Col. R. S., *Army and Navy Club, Pall Mall,* S.W.

1915 Winn, Albert F., 32, *Springfield Avenue, Westmount, Montreal, Canada.*

1922 Winser, H. E., 2, *Mead-road, Cranleigh, Surrey.*

1919 * Winterscale, J., *Sungei Klah Estate, Sungkai, Perak.*

1920 ‡ Withycombe, Cyril Luckes, 12, *Prospect-hill, Walthamstow.*

1919 Wood, H. Worsley, 31, *Ayatc-road, Hammersmith,* W. 6.

1905 Woodbridge, Francis Charles, *Briar Close, Latchmore-avenue, Gerrards Cross S.O., Bucks.*

1914 ‡ Woodforde, Francis Cardew, B.A., c/o *University Museum, Hope Department, Oxford.*

1921 Woolett, G. F. C., *Sipilang, Province Clarke, B.N. Borneo.*

1922 Wright, A. E., *Burnleigh, Kent Bank-road, Grange-over-Sands.*

1919 Wytsman, P., *Quatre Bras, Tervueven, Belgium.*

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1911.

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PARTS I, II. July 31, 1922.

THE

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OF THE

ENTOMOLOGICAL SOCIETY

OF

LONDON

1922.

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TRANSACTIONS

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OF

LONDON

FOR THE YEAR 1922.

546229

I. *Some apparently new South African Genera and Species of the family* Pyralidae. By A. J. T. JANSE.

[Read October 5th, 1921.]

THE species which I here describe were sent some time ago to the British Museum for identification, as Sir G. F. Hampson was then working at certain groups of the Pyralidae.

Owing to lack of time Sir George asked me to describe those that were new, supplying me at the same time with some valuable information as to the generic position of many of the species. I am very much obliged to Sir George and his successor, Mr. W. H. T. Tams, for the kind assistance given in this matter, which must have avoided the making of many synonyms.

In all cases co-types have been presented, when available, to the British Museum, and where many specimens were on hand more than one was sent to this institution.

Unless stated otherwise, the types and co-types are in my own collection and all the material was collected by me, unless the name of the collector has been specially given.

In describing the colours, Ridgeway's colour charts are used, and the figures in brackets indicate the plate on which the colour is to be found.

Crambus leucofascialis, sp. n.

Female. Ground-colour of head, thorax, abdomen and wings white; palpi white on upper-, inner- and under-side, sides ochraceous-buff (xv); maxillary palpi ochraceous-buff at basal half, terminal half white; thorax and abdomen on underside and legs on outer-side white; legs on innerside irrorated and tinged with fuscous; antennae white on upperside, fuscous at sides; patagia ochraceous-buff. Fore-wing :—greater costal half from base to termen ochraceous-buff, tinged with clay colour (xxix) between costa and broad white fascia, gradually becoming white towards inner margin; a narrow costal white edging, most sharply defined at basal half and edged outside with fuscous for one-fourth; a broad white fascia from base to termen with the upper edge from below upper median and between veins 5 and 6, the lower edge from below lower median to vein 2, where it sends a narrow white line along vein 2, then below lower median to vein 3, where also a white line is given off along the vein, then to termen and becoming bifurcate; a white sprinkling on veins 6 and 7; a white irregularly edged, narrow, gently curved line from base of white fascia to tornus; a diffused line of ground-colour on 1*b*, except at base; a fuscous terminal line; cilia at termen with two narrow fuscous-black lines and tipped with fuscous, along tornus and inner margin white. Hind-wing :—white, tinged especially at costal apical area with pale pinkish-buff (xxix); cilia white and a diffused faintly coloured line across it at middle.

Underside :—fore-wing uniformly tinged with hair-brown (xlvi), lighter along costa and where the white fascia is on the upperside, an almost white fascia above vein 1*b* and white scales at termen and terminal parts of veins; cilia almost entirely white near tornus, white and with two broad transverse hair-brown lines from apex to tornus. Hind-wing white, very thinly sprinkled with an indication of a hair-brown transverse line and tipped with same colour at apex.

Exp. Female type 23 mm., four female co-types from 20–25 mm.

Hab. Type, Pretoria, 13. i. 1915; co-types Pretoria in Sept., Oct. and Feb. 1911, 1913, 1915; one badly rubbed specimen from Warmberg (Zoutpansberg distr.) in Dec. 1903. Unfortunately only females have been secured so far.

The fore-wing is long and narrow, costa somewhat arched, termen very oblique, tornus well rounded, inner margin arched. Hind-wing large, termen very oblique and rounded towards tornus, which is much rounded;

palpi nearly three times the head, antennae shortly ciliated.

This species is certainly close to *sjöstedti* Aur., as was suggested to me by Mr. Tams, but it differs from it in vein 11 anastomosing with 12, and veins 4, 5 being stalked, while the palpi are longer; the wing marking is almost identical, but *sjöstedti* is somewhat bigger (27–29 mm.). It is also close to *chalcimerus* Hmpsn., from which it differs in the stalking of veins 4, 5 of fore-wing, the absence of the narrow white line under the fascia and the difference of the white fascia itself. In the hind-wing the stalk of 4, 5 is $\frac{2}{3}$rd of 4, in some specimens shorter or the veins are only approximated to each other.

It comes in Hampson's part *b* of Section III, if the male antennae prove to be simple and not pectinated, which I have little doubt they will prove to be.

Crambus uniformella, sp. n.

Female. Vertex of head, palpi above, on inner- and under-side and hind-wing pure white; sides of head behind the eyes, thorax and abdomen above and on underside, legs, and fore-wing on upper-side tilleul-buff (xl); fore-wing in one specimen (from Pretoria) pale cinnamon-pink (xxix); fore-wing with a very fine irregular thin sprinkling of black scales, most dense where medial, post-medial and subterminal lines would have been; a small black terminal spot between the veins from apex to below vein 2; cilia concolorous. Hind-wing white; cilia white with a faint line at one-third owing to short scales densely placed at base of the more hair-like cilia.

Underside:—fore-wing tinged with avellaneous (xl), except at discal and terminal area; some black terminal points as above but smaller; cilia tipped with avellaneous; hind-wing white with costal area suffused with avellaneous; cilia as above; fore-legs suffused with drab (xlvi).

Exp. Type 28 mm.; co-types 22–28 mm.

Hab. Female type, Waterval Onder, 18. xi. 1920; three female co-types from same locality, 23. xi. 1910, Middelburg town (Transvaal), Dec. 1905, Pretoria, 11. xi. 1908; and one damaged specimen from Rietfontein (Pretoria distr.), 11. xi. 1904. Only females are known to me.

Palpi over two times the head; fore-wing narrow, costa well arched, termen oblique and round from vein 5 to tornus, which is well rounded; inner margin gently

arched; 4, 5 connate at base for a short distance; 11 free from 12, but somewhat curved towards it; hind-wing large, costa almost straight, apex rounded, termen oblique and well rounded, tornus well rounded; 2 from a little beyond middle of lower median; 3 from before angle; 4, 5 shortly stalked and from angle; antennae with very short cilia.

This species is very much like *C. delatalis* Wlk., but differs from it in shape of fore-wing and less clearly defined marking; in shape of wing it comes near *C. ellipticellus* Hmpsn., but is easily separated from this by the uniform colour of the fore-wing.

Crambus reducta, sp. n.

Female. White; palpi at sides irrorated with fuscous; fore-legs tinged on outerside with hair-brown (xlvi); mid-legs tinged on outerside with avellaneous (xl); hind-legs tinged (like abdomen on underside) with tilleul-buff (xl); base of patagia tinged with hair-brown; antennae shortly ciliated, white above and the remainder hair-brown; fore-wing irrorated with hair-brown, more densely at terminal half and inner-marginal area; a narrow dark line along costa from base to one-third; an ochraceous-buff fascia above upper median from base to one-third of wing; a similar but broader fascia till middle of wing below lower median and defined on upper edge by a black, sharply defined line which becomes diffused and interrupted near vein 2; some more dense dark scaling at end of cell; a series of diffused fuscous-black points on the veins, mixed below vein 5 with some yellow scales, indicating the subterminal line, from the costa at three-fourth, oblique to vein 6 and then sharply bent and straight to inner margin before tornus (not parallel to termen from vein 7 to inner margin, as in *C. sectitermina*); no irroration on veins at terminal area; a series of terminal black points in the veins; cilia white, with two transverse hair-brown lines, first line narrow and sharply defined, second more broad and diffused; tips of cilia hair-brown. Hind-wing pure white, with a very faint transverse line at one-third.

Underside :—fore-wing almost evenly suffused with drab; hind wing with the costal area irrorated with drab.

Exp. Female type 22 mm.; female co-type 20 mm.

Hab. Type, Sawmills (S. Rhodesia), 1. ii. 1918; co-type (in rather rubbed condition) from Umvuma (S. Rhodesia), 10. i. 1918 (*Carnegie*).

Certainly closely allied to *C. sectitermina* Hmpsn., with

which it may be confused, but is distinguished from it by the subterminal line being further from termen and more oblique, and consisting mainly of black points on the veins with some yellow hairs mixed; by the shorter palpi, the light fascia in the cell being more diffused, and by the hind-wing having 4, 5 stalked. Vein 11 of fore-wing anastomoses with 12 as in *C. sectitermina*.

Crambus lacteella, sp. n.

Female. Head, palpi except at the sides, thorax, both wings on upper- and hind-wing on underside pure white; abdomen whitish, tinged at basal half with ochraceous-buff; palpi at sides and maxillary palpi at basal half, tegulae and patagia ochraceous-tawny (xv); fore-wing with the costal area at basal half and a fascia below the cell ochraceous-tawny; this fascia is sharply defined on upper edge and diffused at lower edge; costal and terminal area, and inner-marginal area above vein 1*b* for two-thirds of wing irrorated with pinkish-buff (xxix), except on the veins, which remain white; a pinkish-buff diffused streak in cell; black terminal spots on the veins from veins 2 to 8; cilia white, with a line of pinkish-buff at one-third and tipped with the same colour. Hind-wings pure white, slightly irrorated with pinkish-buff; cilia pure white.

Underside :—fore-wing densely irrorated with hair-brown except on inner-marginal area and near termen; cilia as above; veins even darker than on upperside. Hind-wing white; costal area irrorated with hair-brown. Fore-legs on outerside hair-brown, mid- and hind-legs and abdomen on underside vinaceous-buff (xl).

Exp. 24 mm.

Hab. Only one female specimen from Waterval Onder, 21. xi. 1910.

According to Mr. Tams this species is very close to *C. mesombrellus* Hmpsn., which is unknown to me.

Fore-wing moderately broad for a *Crambus*, costa somewhat hollowed out at middle, apex acute, termen oblique and rounded towards tornus, veins 4 and 5 connate at base for a short distance; 11 anastomosing with vein 12. Hind-wing large, semicircular; 2 from before middle of wing; veins 4, 5 shortly stalked. Palpi over two times head; antennae very shortly ciliate.

Diatraea argentisparsalis Hmpsn., **fuscata,** var. nov.

Male, female. Fore-wing densely irrorated with fuscous and the medial and subterminal lines are often noticeable

as brown lines irrorated with fuscous. In perfect specimens is a line of silvery scales at submedial fold and similar scales just beyond the subterminal line; hind-wing smoky grey. I have many males and two females. My twelve typical *argentisparsalis* specimens all come from S. Rhodesia (Salisbury, Emangeni and Umtali in December and January), except one which is from New Hanover (Natal) in February. From the latter locality I have a specimen of var. *fuscata* and one of var. *pallidifascia*, but all my other specimens of these varieties come from Karkloof (not far from New Hanover) and were caught in January.

pallidifascia, var. nov.

This variety is in colour of fore-wing like *fuscata*, but has a long fascia of ground-colour in middle of wing from near base to subterminal line and just under the black point. This fascia is more or less diffused, and when many specimens are available this form will merge into the *fuscata* form. I have many males and two females of this form, all coming from Natal, all but one from Karkloof, one from New Hanover.

At first I thought *fuscata* to be distinct from *argentisparsalis*, but by carefully comparing a large amount of material I came to the conclusion that these two forms are only varieties. It is peculiar, that I have not yet had the typical form from Natal, but only from Rhodesia.

Mesolia uniformella, sp. n.

Female. Ground-colour of head, thorax, abdomen and fore-wing cream-colour; head and thorax irrorated with cinnamon-buff (xxix); maxillary and labial palpi irrorated with cinnamon-buff, leaving the base of the labial palpi white; abdomen irrorated and tinged with cinnamon-buff, on the underside of ground-colour; legs white, femur and tibia of fore-legs densely irrorated in front with saccardo's umber (xxix); mid-legs only slightly irrorated with that colour; tarsi of fore- and mid-legs irrorated with saccardo's umber in middle, especially the fore-legs, so as to leave a ring of ground-colour above and below it; tarsi of hind-legs only very slightly irrorated in that way. Fore-wing with the whole of the basal, costal and apical area and the postmedial line densely irrorated with cinnamon-buff; medial area from cell to inner margin thinly irrorated

with cinnamon-buff and auburn (ii) scales, so as to leave only the ground-colour at the basal area and forming the antemedial and medial lines; these lines are broad and diffused and the medial line is somewhat zig-zagged and inwardly oblique; postmedial line beginning as a broad patch on costa of ground-colour, then diffused and with a fuscous irroration at end of cell; subterminal line of ground-colour, narrow and mostly well defined, oblique and double from costa to vein 6 (outer line zig-zagged) then single and parallel to termen and zig-zagged very sharply at the veins, then to tornus; some fuscous irroration on the veins before it between veins 6 and 3; the outer subterminal line is continued beyond the lobe as an ill-defined line before the terminal line, which is auburn and narrow; apical lobe very blunt; cilia of ground-colour, with a transverse auburn line at one-third and tipped with the same colour and some fuscous. Hind-wing uniformly smoke grey (xlvi), with a fuscous irroration on the veins and along the termen; cilia cream-colour with two smoke grey lines across it as far as from 1c to apex.

Underside:—both wings whitish grey; fore-wing irrorated at costal half and towards termen with fuscous; cilia as above. One co-type (from Umvuma, 20 xii. 1917) has the fore-wing somewhat darker and the markings less distinct as if it were somewhat greasy, which, however, is not the case.

Exp. Type 23 mm.; co-types 22–23 mm.

Hab. Female type, Umvuma, Dec. 1918 (*Carnegie*); two female co-types from Umvuma, 20. xii. 1917 (*Janse*); one female co-type in Transvaal Museum from Waterberg district (Transvaal) in 1899, by Jutrzencka; three other specimens from Shangani (S. Rhodesia), by Miss Chamberlain in Nov. 1919.

This species was identified for me at the British Museum as a *Prionapteryx*, but closer examination has shown me that it should be placed in *Mesolia*, a genus up to now only known from Asia, Australia and St. Helena, so that it is new to Africa. The apical prominence is more like that in *Mesolia*, vein 4 is absent in both wings (in *Prionapteryx* it is present in the fore-wings); 7 is stalked with 8, 9; hind-wing with upper median far from vein 8 and vein 7 curving upwards so as to anastomose with 8; proboscis fully developed; outer spurs shorter than inner, but not in all cases, as much as half the length of the inner one; antennae of female lamellated and shortly ciliate.

HYPSOTROPINAE.

Mesodiphlebia rhodesiana, sp. n.

Male. Head, palpi, thorax and fore-wing cream-colour (xvi); palpi irrorated at sides with fuscous-black; a conical tuft of hair and some scales on frons of cream-colour and fuscous-black mixed; legs cream-colour and irrorated with fuscous; abdomen above and on underside and thorax on underside whitish; antennae cream-coloured. Fore-wing with costal area above upper median whitish, irrorated with fuscous-black but leaving vein 12 and upper median whitish; a more dense irroration below upper median and this is continued to apex below vein 9, where the irroration is most dense; some slight sprinkling of fuscous-black over the whole wing, most dense below lower median on 1*b* and along termen; an antemedial, rounded, diffused spot on 1*b* and a medial irroration suggesting the medial line; a rounded spot with a light centre at end of cell; a diffused postmedial line from 9, parallel to termen, then curved inwardly at 2, then outwardly oblique to tornus; cilia whitish, tipped with fuscous-black and with an indication of a line at middle. Hind-wing whitish or pure white; in some specimens with fuscous suffusion along termen; cilia white.

Underside:—with the ground-colour as above, but in the fore-wing more densely and in the hind-wing slightly suffused with fuscous. Proboscis very slight, but in some specimens visible.

Exp. Male type 14 mm.; four co-types 14–15 mm.

Hab. Victoria Falls in Jan. 1918, caught at light.

Rhinaphe lutosa, sp. n.

Male and female. Head, palpi, shaft of antennae, thorax, abdomen, legs and fore-wing pale ochraceous-buff (xv); palpi sprinkled with black, basal half of third joint irrorated with black; legs irrorated with fuscous-black; fore-wing irrorated with light pinkish-cinnamon (xxix) and more or less densely sprinkled with fuscous-black; all markings on fore-wing fuscous-black; a diffused basal line from below costa; medial line broad and consisting of fuscous-black irroration, from costa to upper median oblique, broad and dense, then erect, faint and only plain on lower median and 1*b*; postmedial faint from costa to upper angle of cell, then inwardly oblique and faint, most conspicuous on upper and lower angle of cell, where it forms a more or less distinct macula; subterminal rather far from termen, inwardly oblique from costa to half-way end of cell

and termen at vein 6, then somewhat excurved and to tornus and only distinct on the veins, where it forms more or less distinct maculae; a terminal series of triangular maculae between the veins; cilia of ground-colour with a distinct broad diffused fuscous line at one-third and a faint and narrow line at two-thirds. Hind-wing whitish, slightly irrorated and tinged towards costa with fuscous; cilia whitish with a faint diffused fuscous line at middle.

Underside whitish; hind-wing slightly and fore-wing very densely irrorated with fuscous-black, especially towards costa; in fore-wing a somewhat lighter irroration at subterminal line; some fuscous terminal stigulae between the veins; cilia as on upperside.

Exp. Type 19 mm.; female type 20 mm.; male co-types 16–19 mm.; co-types from 17–20 mm.

Hab. Male and female types from Sawmills (S. Rhodesia), 1. ii. 1918; nine male co-types from Sawmills in Feb., Emangeni (S. Rhodesia) in Jan., and Bulawayo, Dec. 1919; six female co-types from Emangeni Jan., Sawmills, Feb., Bulawayo, Dec., Mazoe (S. Rhodesia), Dec. 1919.

I have many other males from the same localities and collected at the same time. A female in the Transvaal Museum from the Waterberg distr. (Transvaal) most probably belongs here also, but is in too rubbed condition to be certain.

Perhaps this species requires to be placed in a genus of its own, for the fore-wing has veins 3, 5 on a stalk; however, some species of *Rhinaphe* have these veins connate. Antennae of male serrate at lower half and ciliated over the whole length; in female simple and ciliated.

Rhinaphe flavodorsalis, sp. n.

Male. Head, palpi, shaft of antennae, thorax, ground-colour of abdomen and fore-wing vinaceous-buff (xl); palpi with terminal half of second and whole of third joint irrorated with fuscous-black; some fuscous-black sprinkling on thorax; abdomen above at second, third and fourth segment deep chrome (iii), the remainder sprinkled with fuscous-black; fore-legs densely irrorated with fuscous; mid- and hind-legs, thorax and abdomen on underside sprinkled with fuscous. Fore-wing with the veins, a streak in cell and at submedian fold lighter than the ground-colour, almost white; space between the veins irrorated with fuscous-black, light lines in cell and at submedian fold and on 1*a* and 1*b* edged with fuscous-black irroration; a spot of fuscous-black scales at one-third on 1*b*; a fuscous-black scaling

at upper and lower angle of cell, on upper angle often obsolete; in some specimens a fuscous-black scaling suggesting postmedial line; small fuscous-black spots between the veins at termen; cilia of ground-colour, with a diffused line at middle. Hind-wing white, with a terminal fuscous edging; cilia of ground-colour except the base, while the inner-marginal cilia have a yellowish tinge; a faint transverse line across them from costa to beyond tornus.

Underside :—ground-colour of both wings pale smoke grey; fore-wing very densely irrorated with fuscous-black, especially along costa; hind-wing slightly irrorated with fuscous; cilia darker than on upperside.

Female like male, but antennae simple.

Exp. Male type 17 mm.; female type 16 mm.; male co-types 14–20 mm.

Hab. Male type, Sarnia, Feb. 1910; female type, Sarnia, Feb. 1913. Male co-types from Sarnia in Jan., Feb., Verulam, Dec., Eshowe, Jan., New Hanover, Oct.; in all nine specimens.

Palpi in male obliquely ascending, second joint with rather long hairs and scales on innerside; antennae with lamina as long as thickness of shaft and ciliated; in female antennae simple; frons with a tuft of scales. In one specimen vein 10 is absent in both fore-wings. Hind-wing with 3, 5 on a long stalk of over half to three-fourth of veins.

This species comes in Section II of Hampson, after group *A*, from which it differs in the antennae having no sinus at base.

Saluria albicostella, sp. n.

Male. Head, thorax and fore-wing on upperside jasper red (xiii); palpi whitish, tinged on innerside with jasper red and at tip with fuscous; shaft of antennae at base jasper red; fore-wing whitish but very densely and uniformly irrorated with jasper red, except on lower median, part of veins 2 to 5, the whole of 1*b* and a costal fascia above upper median from base to apex; this fascia is more pure white and only on basal two-thirds partly and slightly irrorated with geranium pink (i); a somewhat dark suffusion against lower part of white fascia; cilia rose dorée (i); hind-wing whitish, with a darker tinge towards apex and along termen; cilia white, with a faint line across at one-third; abdomen whitish, perhaps yellow, but I think that this yellow colour is due to greasiness.

Underside :—both wings light pinkish-cinnamon (xxix), darkest

on upper wing especially towards costa and at base, lightest in hind-wing, especially at inner-marginal area; cilia as above. Legs whitish, but outwardly heavily suffused with geranium pink, especially the fore-legs.

Exp. 23 mm.

Hab. Male type from Barberton, 28. i. 1911 (*Janse*). One specimen only.

This species comes in Section I, *A*, *d* of Hampson, as the palpi are oblique and the antennae of the male are laminated. The antennae have a slight sinus at base.

Saluria pulverata, sp. n.

Male and female. Head, palpi, thorax, legs, abdomen on underside and fore-wing tilleul-buff (xl); palpi at sides, legs on outer side, thorax and abdomen on underside more or less irrorated with fuscous and often tinged with vinaceous-buff (xl); abdomen above pale orange-yellow (iii). Fore-wing in several specimens tinged, except the costal fascia, with vinaceous buff; a costal fascia, formed by a fuscous black irroration, below upper median and extended to costa just before apex; this fascia is sharply defined on upper median and vein 9 but diffused towards lower median; a subbasal and an antemedial broad fuscous-black irroration, well below lower median and an indication of a medial and postmedial similar irroration below the fascia, and of which the postmedial irroration is rather oblique; some fuscous irroration on the fascia, mainly near the costa, leaving the side towards the uppermedian almost white; some black terminal points at end of veins from 1*b* to 6; cilia of ground-colour, slightly tinged with vinaceous-buff. Hind-wing whitish; some slight fuscous terminal irroration from vein 2 to apex and slightly extended over the veins; cilia whitish, with a short row of white scales at base.

Underside:—Both wings whitish; fore-wings rather densely irrorated with fuscous, most densely costad; hind-wing slightly irrorated with fuscous near costa; inner-marginal area pure white. Antennae of male with slight sinus and tuft of scales at base; shaft slightly serrate and ciliate; female antennae simple, minutely ciliated.

Exp. Male type 22·5 mm.; co-types 18–23 mm. Female type 18 mm.; co-types 23 mm.

Hab. Male type, Umkomaas, 23. i. 1914; female type, Umkomaas, 30. i. 1914; co-types from Umkomaas, 4–30. i. 1914, and one male from Sarnia, 17. i. 1912

(*Janse*); also one badly preserved male from Durban, 13. xii. 1916 (v. d. *Merwe*); eleven specimens in all.

I think this is correctly placed in *Saluria*, although the fore-wing has 4 and 5 on a rather short stalk, and though the palpi are obliquely upturned, extending above the frons for length of head and pointed towards tip.

Saluria pretoriae, sp. n.

Female. Head, palpi above, thorax and abdomen ochraceous-buff (xv); palpi and head on underside white; palpi at sides, head and prothorax in some specimens slightly tinged with old rose (xiii), in other specimens well coloured with it, especially the palpi; fore-wing tinged with ochraceous-buff, except a rather broad costal fascia which remains pure white; the ochraceous-buff tinge is lightest towards inner margin and suffused with cinnamon-rufous (xiv) against the white fascia, except near base, where the suffusion is more old rose (in some specimens the suffusion is old rose over the whole length); cilia vinaceous-buff (xl), in some specimens tinged and tipped with old rose. Hind-wing vinaceous-buff, in some specimens whitish; cilia concolorous and with a darker subbasal line.

One female specimen is almost coloured like the example I take to be a male of this species (see below), but the hind-wings are a little lighter.

Underside:—drab-grey (xlvi); fore-wing towards costa well irrorated with light drab (xlvi); cilia drab-grey, in hind-wing with a light subbasal line; legs whitish, tinged outwardly with old rose, especially the fore-legs; thorax whitish, abdomen light ochraceous-buff.

The palpi are porrect and about three times length of head; frons with a tuft of hair; antennae ciliated; fore-wing with veins 4, 5 in most specimens slightly stalked, in one almost from a point, but in the specimen that I think may be the male they are stalked for about half the length of the veins; hind-wing with veins 7 and 8 anastomosing.

Male (?). One specimen which I take to be the male of this species has unfortunately no palpi; the antenna has a very slight sinus with some scales on innerside; the fore-wing is narrower and the colour is darker and without an indication of pinkish. I have little doubt that it belongs here, though it is in too poor condition to be sure.

Exp. Female type 21 mm.; co-types 18·5–21 mm.; male (?) 18·5 mm.

Hab. All specimens from Pretoria. Female type in 7. v. 1910; co-types in May 1910, Oct. 1909, July 1906; thirteen specimens in all. Male (?) from Pretoria in April 1906.

Hypsotropa roseotincta, sp. n.

Male. Ground-colour of head, thorax and fore-wing apricot yellow (iv); palpi at sides and shaft of antennae maize yellow (iv) tinged with pinkish-buff (xxix); abdomen maize yellow; legs maize yellow and densely irrorated with carrot red (xiv); fore-wing has costal area tinged with orange buff (iii) and is above vein 11 densely irrorated with carrot red as far as apex; a similar, but less dense, irroration below lower median till near inner margin where it becomes gradually less dense, except near tornus; a carrot-red rounded spot at end of cell, with some fuscous scales in it; postmedial line produced by a rather broad carrot-red irroration, best defined inwardly, oblique from near apex and parallel to termen to above submedian fold, where it becomes curved inwardly and joins the inner-marginal irroration, then forming a curve outwardly and ending at inner margin at two-thirds; a terminal carrot-red irroration more or less interrupted at the veins. (In some specimens the carrot-red irroration is reduced and even almost absent at inner-marginal area and the macula at end of cell, the postmedial line from vein 6 to inner margin and the indication of an antemedial line from lower median to inner margin consists of a fuscous irroration.) Cilia of ground-colour with a darker subbasal line. Hind-wing white, with a tinge of pale smoke grey along costal and apical area; cilia white, with a pale smoke-grey subbasal line.

Underside:—Both wings whitish; fore-wing irrorated rather densely with drab (xlvi); hind-wing slightly irrorated with drab along the costa only.

Exp. Male type 19 mm.; male co-types 14–16 mm.

Hab. Male type from Pretoria, 4. iii. 1910; co-types from Waterval (Zoutpansberg distr.), 6. xii. 1899; Barberton, Dec. and Jan. 1910, 1911; in all six specimens.

The antennae are lamellated and with moderate cilia and may thus have to be placed in Hampson's *Heosphora*-group.

Commotria simplex, sp. n.

Male. Ground-colour of palpi, head, thorax, abdomen and fore-wing whitish, somewhat irrorated with ochraceous-salmon (xv); palpi at side and in the middle and base of fore-wing along costa suffused with fuscous; fore-wings more or less densely irrorated with ochraceous-salmon, densely along costa but leaving the veins, the cell and plical fold practically free; a series of fuscous spots: two antemedial ones below lower median and indications of one before it above lower median; two medial spots below lower median, upper one strongest, lower one on 1*b* very faint; an indistinct spot at lower angle of cell; a postmedial series of similar spots on the veins, from near apex to 1*b* and somewhat inwardly arranged at vein 6; small terminal spots at end of veins; cilia whitish, tinged with ochraceous-salmon. Hind-wing pure white, with a darker tinged edging along termen; cilia white, with a faint grey subbasal line.

Female. Ground-colour light buff (xv) and more heavily suffused and irrorated with ochraceous-salmon.

Underside:—Wings and legs whitish; fore-wing heavily and hind-wing slightly along costa and legs at front suffused and irrorated with light drab (xlvi); cilia of both wings whitish.

Exp. Male type 18 mm.; female type 20 mm.; co-types 18–22 mm.

Hab. Male type, Salisbury, 27. xii. 1917; female type, Salisbury, 30. xii. 1917; co-types from Salisbury, Dec. 1917, and Umvuma, Dec. 1917.

The antennae of the males are laminate and ciliate, of females simple. In all 5 males and 2 females.

Commotria albistria, sp. n.

Male and female. Head, thorax, abdomen and veins of fore-wing pure white; palpi with the second joint on innerside and the whole third joint fuscous; vertex at sides and patagia tinged with tilleul-buff (xl); most veins edged on both sides by a black irroration; costal, terminal and inner marginal area tinged with light vinaceous-fawn (xl); space in cell and between vein 1*b* filled up with cream-buff (xxx); a white line below 1*b* from base to inner margin at middle; inner margin with a white edging which is broad at base; a blackish irroration on 1*b* at one-third and a series of black post-medial irroration on vein 1*b* to vein 5; some black irroration between veins 8, 9; a similar irroration between all veins at termen; cilia tilleul-buff with blackish subbasal tufts between the veins, leaving

a light-coloured basal line; hind-wing whitish, with terminal area irrorated and suffused with drab (xlvi); cilia whitish with a drab subbasal sinuated line, leaving the base of the cilia slightly yellow. Abdomen above with the first few segments pale orange-yellow, but owing to greasiness it is not possible to see how far it extends.

Underside :—Whitish, heavily suffused, especially along costa of fore-wing with hair-brown (xlvi); hind-wing almost whitish at inner-marginal area; cilia as above, but subbasal line continuous. Legs whitish, somewhat suffused with light drab.

Exp. Male type 20 mm.; female type 21 mm.; co-types 17–24 mm. Four males and twelve females.

Hab. All specimens but two from Sawmills (S. Rhodesia), the two from Victoria Falls, 27. i. 1918; male type, 1. ii. 1918; female type, 4. ii. 1918; co-types from 1–5. ii. 1918.

Commotria ruficolor, sp. n.

Male and female. Head, palpi, thorax, legs and ground-colour of fore-wings pale yellow-orange (iii), heavily suffused, except vertex of head, with carrot red (xiv); palpi at sides slightly irrorated with fuscous; fore-wing with ground-colour only on veins 12, 11, part of veins 10 and 9, upper- and lower-median and vein 1*b* paler than ground-colour of wing; a similar pale line just before costa; some slight fuscous irroration here and there in the wing, especially below upper median and towards apex; a rounded fuscous irroration at lower angle and an indication of some antemedial spots; a postmedial series of similar spots above the veins, sometimes partly or entirely wanting; a terminal series of fuscous spots at end of veins, but sometimes wanting; cilia carrot red. Hind-wing pure white with very slight tinge of pale yellow-orange.

Underside :—Tilleul-buff (xl), darkest on fore-wing, almost white on inner-marginal area of hind-wing; cilia whitish. One male from the same locality with the irroration on fore-wing black and more dense, extended from base along upper part of cell to apex, even into the cilia; a faint irroration below lower median at middle, one below origin of vein 2, and postmedial series broader and more marked. Cilia of hind-wing at apex tinged with carrot red.

Exp. Male type 18 mm.; female type 22 mm.; co-types 20–26 mm.

Hab. Male type, Victoria Falls, 25. i. 1918; female type, Umtali, 5. i. 1918; co-types all from Umtali, 3–11. i. 1918.

According to the British Museum, this species comes close to *C. mesiella* Hmpsn.

Palpi are porrect and a little over three times length of head; in female four times head. Antennae in male uniserrate and ciliate and in female ciliated only.

Commotria leucosparsalis, sp. n.

Male and female. Head, palpi, thorax, and abdomen on underside and ground-colour of fore-wing warm buff (xv); abdomen above light orange-yellow (iii); legs warm buff sprinkled with white scales and hairs; tarsi on outer side avellaneous (xl), terminally ringed with warm buff; palpi at sides, thorax here and there and fore-wing at inner-marginal area sparsely sprinkled with fuscous-black (xlvi); in two specimens from Sawmills the palpi, thorax and ground-colour of fore-wing are more cinnamon-buff (xxix) and the fuscous-black irroration is more dense; fore-wing with costal area as far as the lower median and especially on the veins well irrorated with white scales; veins 1*b* and 2 postmedial area between veins 2 to 5, and the terminal area as far as vein 2 also irrorated with white scales; costa at base with rufous (xiv) scaling; a fuscous-black elongated antemedial spot on vein 1*b* and similar striga above it on lower median and discal fold, the two spots connected by an outwardly curved irroration suggesting the antemedial line; some well-marked irroration below it to inner margin; medial line from middle of inner margin to lower angle and some irroration on disco-cellulars; two narrow fuscous-black striga from disco-cellulars to postmedial line, one on vein 5 and one on vein 6; a fuscous-black elongated postmedial series of points on veins 1*b*, and 3 to 7, those on 6 and 7 often obsolete; a series of terminal fuscous-black spots between veins 1*b* to 7; the costal half of the wing here and there sprinkled with rufous (xiv) scales, which are absent in the "Sawmills" specimens, these, however, have more fuscous-black and even black irroration and a corresponding decrease of white scaling; cilia of ground-colour and with two transverse lines produced by fuscous and white scales mixed. Hind-wing sub-hyaline, light buff (xv) and tinged on the veins, costal and terminal area with buff-brown (xl); cilia of ground-colour with one buffy-brown transverse line at ½rd.

Underside:—Both wings with ground-colour light buff but fore-wing densely irrorated and hind-wing slightly tinged at costal area with fuscous; cilia as above, but on fore-wing without the white scales.

Antennae of male unipectinate for two-thirds, branches over

width of shaft; a scale tuft on upperside above basal joint and about six joints in length; in female antennae simple. Palpi of male rostriform and porrect, about two times length of head; in female drooping.

Exp. Male type 20 mm.; female type 24 mm.; male co-types 18·5 mm. to 24 mm.; female co-type 23 mm.

Hab. Male type, Umkomaas, 2. i. 1914; female type, 28. i. 1914; co-types from Umkomaas, 10–31. i. 1914, Maritzburg, 1. ii. 1916, Sawmills, 1–4. ii. 1918; in all eight specimens.

Statina albivenella, sp. n.

Male and female. Head, palpi, antennae, thorax and legs, abdomen and fore-wing pale yellow-orange (iii); palpi, tuft of hair on frons, legs on outerside and abdomen on underside irrorated with fuscous; fore-wing with vein 12, upper median and vein 11, lower median and vein 1*b* white; the latter two with fuscous irroration; costa well irrorated with fuscous; all maculae consist of fuscous irroration, often ill-defined; the first macula is on vein 1*b*, followed by an antemedial series of three maculae, one on lower median and ill defined, second on 1*b*, third at inner margin; a well-defined rounded macula at end of cell; a postmedial oblique and straight series of maculae, first on vein 6 and rather narrow, second between veins 4, 5, third on vein 3 and fourth on 1*b* to inner margin; a white line on upper median and vein 11, edged on inner side by a fuscous irroration which is continued to apex, where it joins a terminal fuscous irroration which is broad near apex and narrowing to 1*b*; cilia whitish at base, then pale ochraceous-buff (xv) and with a transverse fuscous line at one-third. Hind-wing whitish; some terminal fawn-coloured (xl) suffusion; cilia light-buff (xv) with a faint transverse line at one-third.

Underside whitish; fore-wing heavily and hind-wing slightly suffused with avellaneous (xl); cilia of fore-wing avellaneous and with a dark transverse line at one-third; hind-wing cilia as above, but transverse line more distinct.

Exp. Male type 16 mm.; female type 18 mm.; co-types from 16–17 mm.

Hab. Male and female types from Barberton, 19–20. xii. 1910; co-types from Barberton, 15. xii. 1909 to 5. i. 1910; one male co-type from Nelspruit, Nov. 1917, collected by Dr. Breyer, and in the Transvaal Museum. In all seven specimens, of which only one is a female.

Sir George Hampson informed me that he thought this species ought to come into a new genus, but I do not think it sufficiently distinct from *Statina*, as far as I know that genus from the description. I thus leave it here for the present, as it differs from *Statina* only in the following characters: Maxillary palpi two-jointed and with long hair, antennae with basal joint moderate, cylindrical, shaft rounded and without scales above the basal joint, ciliated; fore-wing with vein 11 from upper angle; 6 from nearly $\frac{2}{3}$ of disco-cellulars.

Calamotropodus, gen. nov.

Type **grisella.**

Proboscis minute; palpi obliquely porrect, about two times length of head; first joint small, second joint four times as long as first joint, broad at middle, inner edge well curved outwardly, outer edge slightly curved inwardly; third joint about one-third of second joint and pointed, second and third joint covered with dense hairs and scales; maxillary palpi apparently absent; frons with a large conical prominence which ends bluntly and forms a circle, it is covered with hairs and scales; antennae laminated and ciliated. Fore-wing rather broad, about one-third of length; costa gently arched; apex rounded, termen oblique and arched; vein 2 from well before lower angle; 3 and 5 well apart; 4 absent; 6 from before upper angle; 8, 9 stalked for one-third of 8; 10 free and from half-way upper angle and origin of vein 11; 11 free; 12 parallel to upper median and vein 11. Hind-wing with vein 2 from near lower angle; 5 from angle; 3 and 4 absent; 6 and 7 very shortly stalked; 8 anastomosing with 7 for about $\frac{1}{3}$ of 7.

I have little doubt that this genus comes near *Calamotropa*, from which it differs in the position of vein 2 in fore-wing and in vein 8 of hind-wing anastomosing with 7, also in the absence of the maxillary palpi and in the presence of the tongue, though it is rudimentary.

Calamotropodes grisella, sp. n.

Male. Palpi, head, thorax and abdomen above milky white; abdomen above whitish; palpi irrorated at sides with black; tegulae tinged with cream-buff (xxx); fore-wing with a broad cream-buff fascia from base to near apex, well defined costad, diffused on the other side and edged with blackish on upper median and vein 8, extending to lower median and beyond the cell broken

up into two spurs by vein 6; costal white fascia irrorated with black, except near upper median and vein 9, where it remains pure white; a black irroration on lower median and vein 1*b* and below that at basal half, a dense irroration at terminal area; a blackish diffused spot on upper and lower angle; cilia drab (xlvi), with three narrow transverse white lines across, caused by white tipping of the scales. Hind-wing whitish with the apical and terminal area suffused with drab; cilia whitish with a subbasal drab line.

Underside :—Wings, abdomen and legs whitish; legs and abdomen densely irrorated with black; fore-legs on outer side suffused with quaker drab (li); abdomen left white at the end of each segment. Fore-wing deeply suffused with quaker drab including the cilia; hind-wing irrorated with quaker drab and fuscous, cilia only suffused with quaker drab at apical area.

Exp. Type 17 mm.; co-types 16–20 mm.

Hab. All specimens from Sawmills (S. Rhodesia), 1–5. ii. 1918; seventeen specimens in all.

Polyocha anomalella, sp. n.

Male, female. Head, palpi, thorax and fore-wing light vinaceous-cinnamon (xxix); fore-wing slightly sprinkled with fuscous; the veins and three fascia in cell, of which the middle one is continued beyond the cell to termen, whitish; cilia of ground-colour. Hind-wing cartridge-buff tinged with pinkish-buff towards termen and cilia with a basal line of that colour; a slight fuscous irroration at apical and terminal regions.

Underside :—Both wings whitish, densely irrorated with fuscous; legs light vinaceous, irrorated with fuscous.

Exp. Male types 31 mm.; female type 36 mm.; co-types 31–35 mm.

Hab. Male and female type from New Hanover (Hardenberg), 15th Jan. and Feb. 1915; co-types from Karkloof, 13. i. 1917; Shafton House (Symons), 19. iii. 1917; New Hanover, 9. iii. 1914; Barberton, 19. xii. 1910 (*Janse*); six specimens in all.

It was suggested at the British Museum that this species should be placed in the genus *Emmalocera*, but the fore-wing has as a rule veins 4, 5 stalked and not apart from 4 as is the case in that genus. The specimens examined at the British Museum have these veins from a point and approximated to each other for a long distance, but the other specimens have them clearly stalked, often for nearly half

their length. The maxillary palpi are small and not hidden in the labial palpi; on the other hand, the antennae of the male have a sinus at near base with a tuft of scales and the shaft is pectinate with uniserate branches of about three times the shaft; the frons has a tuft of scales. In the female the antennae are simple, slightly laminate and ciliate.

EPIPASCHIANAE.

Neopaschia, gen. nov.

Type **flavociliata**, sp. n.

Female. Palpi upturned, slender, reaching above vertex; first joint about half of second, third a little shorter, palpi smoothly scaled; maxillary palpi invisible; tongue absent; antennae shortly ciliated and without a tuft at base. Fore-wing rather narrow, costa and apex rounded, termen straight and oblique; a tuft of raised scales at end of cell; 1*b* simple at base; cell rather long, $\frac{3}{5}$ of wing; 2 from before angle; 3, 4 from angle, stalked for $\frac{1}{3}$ of 3; 5 absent; disco-cellulars faint; 6 from well before upper angle; 7, 8 from upper angle, stalked for $\frac{3}{4}$ of 8; 9 absent; 10 from just before angle; 11 from $\frac{3}{4}$ of upper median; 12 parallel to upper median and vein 11. Hind-wing semicircular; termen with rounded lobe at 2–3; apex and tornus well rounded; cell over half of wing; 2 from near lower angle; 3 and 4 from angle, stalked for $\frac{1}{4}$ of 3; 5 absent; 6 and 7 from upper angle; 7 and 8 anastomosing for about $\frac{1}{6}$ of 7 and well beyond origin of 7; frenulum simple.

This is the most reduced Epipaschianid known to me, and must be placed immediately before *Arnatula*, from which it differs mainly in the absence of vein 5 in both wings and of 9 in the fore-wing. Unfortunately no males are known to me.

Neopaschia flavociliata sp. n.

Female. Ground-colour of head, thorax, abdomen and wings maize yellow (iv); head, palpi, thorax and fore-wing densely tinted and irrorated with morocco red (i); legs morocco red, sprinkled with black, tarsi of fore- and mid-legs fuscous-black, of hind-legs irrorated with fuscous, and terminally ringed with yellow; antennae with shaft morocco red; tegulae tipped with yellow and closely irrorated with morocco red; abdomen on upper- and under-side closely irrorated with morocco red. Fore-wing over the whole

area except a line before the medial and beyond the postmedial line so densely irrorated with morocco red that the ground-colour can scarcely be seen; an ill-defined antemedial line of orange-rufous (ii) scales mixed with black scales; medial line before middle of wing, black, curved from costa to inner margin and sharply incurved at lower median, the black line is preceded by a broader line of ground-colour, irrorated with orange-rufous; raised scales at end of cell orange-rufous; postmedial line from beyond $\frac{2}{3}$ of costa to near tornus and of ground-colour, beginning at costa with some black scaling, then bordered on innerside with orange-rufous scaling, as far as vein 3 and curved inwardly to vein 2. then sharply excurved to tornus; from vein 3 to tornus the interior bordering consists of black scales; some white and black scales in apical area; cilia light orange-yellow (iii) mixed at apex and tornus with morocco red; two lines of morocco red across the cilia which are slightly tipped with the same colour. Hind-wing densely and evenly irrorated with fuscous; indications of a postmedial fuscous-black line from 1*c*–4, preceded and followed by a patch of morocco red scales; cilia light orange-yellow, except at tornus where they become fuscous-black, near apex they are well mixed with morocco red; three lines of morocco red across the cilia, of which the two inner ones are broadest and best defined.

Underside :—both wings heavily irrorated with fuscous; costa of fore-wing and the apical area irrorated with morocco red; postmedial line better defined and reaching from costa to tornus, oblique from costa to vein 2 near termen, then curved inwardly between veins 2 and 1*c*, 1*c* and 1*b*; this fuscous-black postmedial line is bordered outside by a line of ground-colour; cilia of both wings as on upperside.

Exp. Type 19 mm.; co-type 18 mm.

Hab. Type from Barberton, 11. xii. 1910; co-types, Barberton, 7. xii. 1910, and Three Sisters (Barberton distr.), 6. iii. 1911. Unfortunately only females have been caught so far.

Macalla melanobrunnea, sp. n.

Ground-colour of head, thorax, abdomen, wings on upper- and under-side and legs cream-colour (xvi); head densely irrorated with black; palpi with basal half covered with morocco red (i) scales and a few black scales between; upper half of palpi irrorated with black scales, except ends of second and third joints which remain cream-coloured; fore-legs with femur and tibia densely irrorated with morocco red; tarsi cream-coloured and broadly banded with

black; mid-leg with the femur and tibia a little less densely irrorated with morocco red, tarsi and spurs cream-coloured and broadly irrorated with black; hind-legs thinly irrorated with morocco red and black scales mixed, irroration on the spurs and tarsi less dense; thorax above irrorated with morocco red and black scales mixed; abdomen above with first segment narrowly irrorated with black, second broader black irroration, third with black irroration on posterior half only, fourth to seventh almost entirely black, mixed with some ochraceous-salmon (xv) scales except at the sides and leaving a very narrow line of ground-colour posteriorly; eighth segment irrorated with deep chrome (iii) scales mixed with ochraceous-salmon; antennae ciliated, shaft sayal brown (xxix), basal process as long as thorax and covered with rather long black spathulated scales and some hairs, especially towards extremity. Fore-wing with a little less than basal half densely irrorated with morocco red, black and bluish slate-black (xlviii), mixed so as to appear to the naked eye quite black with a steel-blue gloss; a faint diffused subbasal ochraceous-orange (xv) line from costa to 1*b*; antemedial line of same colour from costa to inner margin, beginning as a cream-coloured broad patch at costa and having a fan of black scales on it in cell and a similar fan before it below lower median; medial line, defining black area, straight and erect and with a fan of black scales in cell often projecting a little beyond the line; this fan is surrounded by yellow-brown scales; a postmedial line of ground-colour, preceded by some black triangular scaling at the costa, directed outward to vein 5 and somewhat dentated between the veins, then curved somewhat inwardly to plical fold, then to tornus; area before this line from vein 6 to inner margin densely irrorated with morocco red and some yellow irroration before this; whole area beyond the postmedial line irrorated with morocco red, except a terminal area, which is broad near apex and ends at vein 2; terminal area irrorated with yellow; some terminal black lunules on the veins, which have a tendency to become a fine black terminal line in some specimens; cilia with a faint line in middle and of ground-colour. Hind-wing with some fuscous scales on inner margin near base; a fuscous postmedial irroration from before vein 2 to vein 3; a subterminal fuscous irroration from 1*c* to apex, densest near tornus and gradually getting more sparing towards apex; a terminal irroration from tornus to vein 2, then becoming lunules on the veins; cilia with a faint line in middle.

Underside:—both wings of cream-colour; fore-wing irrorated at basal half with black and beyond that the costal area is irrorated with morocco red; a postmedial line, corresponding to the one on upperside, but situated before it and consisting of black irroration;

terminal lunules as above; hind-wing with costal half as far as postmedial line, thinly irrorated with black scales; medial line of black irroration from costa to 1*c*, then angled upwards between 1*c* and 1*b*, where it ends; terminal irroration more conspicuous than above.

Female. Fore-wing as in male, but irroration more dense and the markings more sharply defined; cilia with well-marked middle line consisting of chequered patches of black scales; more black scales towards outerside especially near the apex; hind-wing with dense irroration of fuscous all over and markings darker than in male, in addition a morocco-red scaling between veins 1*c* and 3 just before and well beyond the postmedial line; cilia as on upper wing.

Underside as in male, but wings densely irrorated with morocco red and mixed, as far as postmedial line, with fuscous scales; cilia also with a more distinct fuscous line in middle.

Exp. 22–25 mm.

Hab. Male type from Hope Fountain (near Bulawayo), 16. i. 1918; female, Bulawayo, 15–23. xii. 1919; eleven male co-types from Hope Fountain, Pretoria, New Hanover, Sarnia, Eshowe, Barberton, and Waterval Onder, in Nov., Dec., Jan., Feb.; four female co-types from Bulawayo, Waterval Onder, Barberton, Sarnia, Umkomaas, and one very worn specimen from Pinetown.

The palpi of the male have the second joint above the vertex of head and are curved backwards; the third joint is a little less than half of second joint, in female the second joint is less than half of second joint; second joint with a tuft of hairs and scales on innerside. Antennae in male with longer cilia than in female; antennal process as long as thorax and covered with rather long spathulated scales and some hairs, especially toward apex. Hind-wing with vein 3 from before angle; 4, 5 from angle and approximated for only $\frac{1}{5}$ of length; 6 and 7 from upper angle; hind-wing with 4, 5 approximated only for $\frac{1}{4}$. This species comes very close to *melanobasis*, from which it differs in the following respects: abdomen with black dorsal patches except on the last segment; fore-wing with a fan of black scales on end of cell and with no apical patch; the two black apical striae absent, but on the other hand it has a fine terminal black line from near apex to tornus, often consisting only of lunules between the veins. Hind-wing with a diffused fuscous post-

medial mark from vein 2 to 5; a subterminal suffusion from vein 2 to apex and a black terminal line from tornus to apex.

Macalla melanosparsalis, sp. n.

Male. Head, thorax, abdomen, legs and wings whitish, more or less irrorated with black and fuscous-black (xlvi); head and thorax above densely irrorated with black; palpi almost black, third joint about $\frac{1}{3}$ of second, evenly scaled; second joint just reaching vertex of head; antennae with the shaft fuscous, ciliated; basal antennal projection as long as thorax, covered with black, often spathulated scales and hairs; fore-legs with femora tinted with brick red (xiii) and irrorated with black, tibiae slightly so; tarsi black ringed with cream-colour; mid- and hind-legs, including spurs and tarsi, more or less densely irrorated with black; abdomen with first and second segment with a black mark confluent, so as to form one triangular patch, with the apex towards thorax; third segment irrorated with black for over posterior half, segments 4–7 evenly irrorated with black and ground-colour somewhat darker; eighth segment slightly irrorated with black; fore-wing with some subbasal brownish-red irroration mixed with black; a dense black irroration beyond this till antemedial line; a fan of spreading scales below lower median and before antemedial line and another in cell on antemedial line; medial line broad, black and with a fan of black spreading scales in cell, straight and inwardly oblique; costal area beyond medial line black, discal and inner-marginal area thickly irrorated with black scales; postmedial line black, broad and distinct from $\frac{2}{3}$ of costa to vein 6, then obsolete, diffused and double, inwardly oblique to plical fold, then erect to $\frac{2}{3}$ of inner margin; whole area before this line and from vein 6 to tornus beyond this line irrorated with black scales; a dense black apical irroration well beyond postmedial line; just beyond this line at vein 6 the subterminal begins, so as to appear almost as a continuation of postmedial, but somewhat narrower, this line is dentate between veins 6–2 and somewhat curved, then angled inwardly to plical fold, then to near tornus; area, as far as termen, irrorated with black; a rather broad terminal black line, interrupted by very narrow streaks of ground-colour on the veins; cilia vinaceous-buff with a light thin basal line and a diffused light line in middle, also with some black scales opposite the veins before the middle line; some black terminal scales beyond this line. Hind-wing with a fuscous-black postmedial irroration from costa to 1*c*, from 3 to 1*c* broad and dense; beyond the postmedial the whole area is irrorated with fuscous from costa to 1*b*, broadest and densest between veins 3

and 1*c*; a terminal line as in fore-wing; cilia as in fore-wing, but without the black scales opposite 1*a*, *b*, and *c*.

Underside :—fore-wing irrorated with vinaceous-buff and fuscous, least dense at inner-marginal area; a densely irrorated black spot at end of cell; the combined upper part of postmedial and subterminal lines well marked by a dense fuscous irroration; terminal line almost as clear as on upperside; hind-wing with costal and terminal area as far as 1*c* irrorated with vinaceous-buff; postmedial line indicated by a fuscous-black irroration from costa to 1*b* and before it some thin fuscous irroration; terminal line more diffused than in fore-wing.

Female like male, but hind-wing more densely irrorated with fuscous all over; cilia of antennae very short and no basal process.

Exp. Male and female types 25 mm.; two of the male co-types 22·5 mm.

Hab. Male type, Hope Fountain (near Bulawayo), 16. i. 1918; female type, Hope Fountain, 17. i. 1918; male co-type, Sawmills (S. Rhodesia), 5. ii. 1918; Hope Fountain, 16. i. 1918; Emangeni (S. Rhodesia), 18. i. 1918; one male co-type in Transvaal Museum collection from Waterberg distr. 1899.

This species is near to *M. melanosparsalis* Hmpsn.

Macalla cupreotincta, sp. n.

Male. Head, palpi, antennal process and thorax above densely irrorated with black and deep olive; fore- and mid-legs deep olive, irrorated with fuscous; hind-legs and rings of all tarsi cream-colour, irrorated with fuscous; abdomen above as in *M. confusa*, but the last three segments less densely irrorated. Fore-wing with basal patch as in *M. confusa*, but irrorated with black and bluish slate-black (xlviii) scales, except along costa; irroration between medial and postmedial lines more dense and mixed with ferruginous irroration; postmedial line more diffused and more dentate, but otherwise as in *M. confusa*; apical and terminal area as in *M. confusa*, but irroration more dense; cilia more uniform fuscous-black. Hind-wing irrorated, except at basal-costal area, with ferruginous scaling, which is very dense and uniform at apical-terminal areas as far as 1*c*; a small postmedial fuscous-black macula near vein 2 and terminal lunule opposite more broad; terminal line much more narrow than in *M. confusa*; cilia ferruginous with fuscous-black marks as in *M. confusa*.

Female. Fore-wing with the markings more sharply defined and darker; postmedial line well defined; cilia almost entirely fuscous-

black. Hind-wing irrorated with ferruginous, very densely at terminal half; postmedial line distinct and from costa to vein 1*b*, then interrupted and continued between 1*b* and 1*a*; a similar streak towards base on 1*c*; some fuscous-black irroration at apical-terminal area; terminal line more broad and distinct than in male; cilia ferruginous, with fuscous scale at end of veins from 8 to 1*c*.

Underside as in *M. confusa*, but more suffused and irrorated with ferruginous, especially in female.

Exp. Male and female types 26 mm.; male co-type 22 mm.

Hab. Umtali, male type, 5. i. 1918; female type, 9. i. 1918; male co-type (in British Museum), 12. i. 1918.

In ground-colour and general marking this species is almost identical to *M. confusa* mihi, but the additional irroration of ferruginous (xiv), especially on the hind-wings, give this species a darker and more coppery appearance.

Macalla confusa, sp. n.

Male. Palpi, antennal process, thorax, base and apical part of fore-wing deep olive (xl); ground-colour of fore-wing and hind-wing on upper- and under-side, thorax on underside, legs and abdomen cartridge-buff (xxx); head, palpi, antennal process and thorax irrorated with black scales; antennal process thickly covered with rather long scales and hairs, especially towards apical half, process reaching to end of thorax; antennae ciliated, shaft fuscous; palpi reaching above vertex of head, smoothly scaled, irrorated with black scales, very densely at third joint, and half of second joint; thorax and abdomen on underside irrorated with black; femora of all legs densely irrorated with black; tibia of all legs with a ring of ground-colour in middle and densely irrorated with fuscous-black (xlvi); tarsi of all legs fuscous-black ringed with ground-colour; abdomen with first and second segment each with a triangular black dense irroration so arranged that the apices touch each other; third and fourth segment irrorated with black on posterior two-thirds, so as to leave an anterior ring of ground-colour; remaining segments rather densely irrorated with black, especially posteriorly. Fore-wing with basal deep olive patch sparsely irrorated with black; base at inner margin showing some ground-colour; a tuft of projecting scales on outer half of deep olive patch at inner margin; three black fans of spreading scales, one below lower median on subbasal line, which is only indicated at costa by a faint striga of ground-colour, second half-way in cell, third and largest at end of cell and projecting beyond the medial line which forms the boundary of the apical deep olive patch; medial line almost straight, slightly

oblique inwardly and only indicated by a more dense black irroration; postmedial line black, from two-third of costa, very oblique to vein 5, broad and almost straight, then forming an outward curve till vein 2 and dentate between each vein, then curved inwardly to vein 1*b*, then oblique to near tornus (probably this line is formed in the same way as in *melanosparsalis*, but the origin of the subterminal line and the greater part of what was the postmedial line beyond vein 5 is entirely lost, so that it appears one continuous line); area before the postmedial line and a thin line beyond it of ground-colour and thinly irrorated with deep olive and black; remaining space beyond postmedial light line and termen entirely filled in with deep olive, slightly irrorated, especially on the veins, with black; a broad black terminal line, leaving a striga of ground-colour on each vein; cilia with three rows of chequered fuscous-black scaling opposite the veins. Hind-wing very sparsely irrorated with fuscous at basal two-third; a postmedial fuscous irroration from costa to vein 1*b*, then faintly continued between veins 1*a* and 1*b* to base of wing, this irroration is very dense, broad and black between 1*c* and vein 3; a little distance from this postmedial irroration the apical area as far as vein 1*c* is thinly irrorated with fuscous; a broad terminal black line as in fore-wing; cilia as in fore-wing, but getting of ground-colour near tornus.

Underside:—both wings only irrorated at costal and apical region and very thinly fuscous in fore-wing and brownish in hind-wing; a fuscous dense irroration in cell of fore-wing and a rather dense irrorated patch at end of cell; a similar patch in cell of hind-wing; postmedial line as on upperside, but more faint; terminal lines consist of small black maculae only, situated between the veins; cilia as on upperside. Female with the antennae very shortly ciliated; wings on upper- and under-side as in male but more densely irrorated, especially in hind-wing.

Exp. Male 25 mm.; female 28 mm.

Hab. Male and female type, Bulawayo, 15–23. xii. 1919; eleven other males from Hope Fountain (near Bulawayo); Umtali, Emangeni in Dec. and Jan. This species is probably a development of *M. melanosparsalis*.

PYRALINAE.

Delopterus, gen. nov.

Type **basalis**

Proboscis well developed; palpi porrect, extending beyond head about diameter of eye, loosely covered with scales, third joint hidden

in hairs, filiform, about half of second joint, first joint nearly half of second joint; maxillary palpi small, three jointed and triangularly covered with hairs and scales; frons rounded; antennae with a tuft on front at first joint, shaft in male serrate and biciliate, in female almost simple, cilia very short; tibia smoothly scaled, hind tibia with some hairs and two pairs of spurs, outer spur about half of inner spur. Fore-wing triangular, costa nearly straight, apex well rounded, termen very oblique, slightly rounded, tornus well rounded, inner margin straight, cell long, nearly $\frac{2}{3}$ of wing; 1*b* apparently simple at base; 2, 3, 4, 5, 6, and stalk of 7, 8, 9, 10 at nearly equal distances given off from the cell; greatest distance between 5 and 6, shortest between 4 and 5; 7, 8, 9, 10 on a stalk of nearly half of 9; 7 from 8 just a little beyond 9; 11 from $\frac{3}{4}$ of upper median; 12 straight. Hind-wing subtriangular; costa well curved from $\frac{2}{3}$, apex rounded, termen very oblique, nearly straight and roundly lobed at 1*b*, tornus rounded, inner margin straight; cell nearly $\frac{2}{3}$ of wing; 2 from beyond $\frac{2}{3}$ lower median; 3 from $\frac{2}{3}$ 2 to 5; 4 absent; 5 from lower angle; 8 parallel to upper median and very little approximated to 7

The triangularly scaled maxillary palpi are rather peculiar to this sub-family, the only other genus known to me to have such palpi is *Sindris*, but in that the labial palpi are upturned and the venation of both wings is totally different. I do not think, however, that this genus has any affinity with *Sindris*, it is perhaps more related to *Discordia*, which has the maxillary palpi more strongly developed. From this and *Proteinia* it differs in the coincidence of veins 4 and 5 in hind-wing; from the latter genus it differs mostly in length of lappi, shape of wings and venation of both wings; in wing-shape and general appearance it mostly resembles *Discordia*. From this it differs in the maxillary palpi, absence of vein 5 and in vein 9 of fore-wing coming from 8 before 7, and 2–5 being far from each other and at equal distance. In the hind-wing vein 8 is very slightly curved towards vein 7 and is more remote from that vein than in any other Pyralinae known to me.

Deltopterus basalis, sp. n.

Male and female. Head, palpi, thorax, abdomen, fore- and mid-legs, and ground-colour of fore-wing natal brown (xl), freely sprinkled with white; hind-legs warm buff (xv); tarsi of mid- and hind-legs natal brown, terminally ringed with warm buff; meta-

thorax with black scales and abdomen above with two semicircular maculae on sixth segment, dorsally separated from each other by white scaling; two lateral tufts of natal brown hairs on last abdominal segment. Fore-wing with the area between basal and antemedial lines not sprinkled with white; some dark antemedial edging against it, where the white scaling is very dense, gradually diminishing towards costa and medial line, which is very indistinct; a black spot at end of cell, around which the white irroration is quite dense; white irroration between antemedial and postmedial lines less dense at costa; postmedial beginning from costa as an oblique, well-defined, white striga as far as vein 6, then indistinct and somewhat wavy to tornus, sprinkled on outer side with white; no white scaling from costa to vein 5 between postmedial and subterminal lines; from vein 8 to vein 2 the subterminal area is densely scaled with white; terminal line black; interrupted on the veins by white; cilia consist of fuscous and white scales mixed, with two transverse lines, of which the first is edged with white. Hind-wing whitish, evenly, except at base, irrorated with natal brown; terminal line of denser natal brown irroration; cilia with base whitish and with a transverse whitish line.

Underside whitish. Forewing densely irrorated with fuscous, sparsely at inner-marginal area and with some white scaling along costa and termen as far as vein 4; terminal line fuscous, with light spots on the veins; cilia light at base, transverse lines as above, but with white scaling at middle from costa to near tornus. Hind-wing thinly irrorated with fuscous, densest at costal and terminal area as far as vein 1*c*; cilia as above.

Exp. Male type 18 mm.; female type 17 mm.; male co-types 16–19 mm.; female co-type 20 mm.

Hab. Male type, Pretoria, 25. xii. 1916; female type, Pretoria, 21. ii. 1917. Male co-types from Pretoria, 12. xii. 1911 (*Lord Gladstone*), in Transvaal Museum; in coll. Janse from Sawmills, 1–4. ii. 1918; Bulawayo, 15–23 Dec.; female co-type from Pretoria (*Capt. Paget*) in Dec. 1911 (in Transvaal Museum); in all eighteen specimens.

Dattinia natalensis, sp. n.

Male and female. Head, palpi, shaft of antennae, thorax, abdomen at sides and on underside, last two segments on uppersides, and legs cream-buff (xxx); ground-colour of fore-wing light buff (xv); abdomen on upperside orange-buff except last two segments and narrow rings at end of each segment; palpi at sides here and there

irrorated with black; all legs irrorated with black; branches of antennae black; fore-wing has basal half, except along inner margin, irrorated with black, densely at cell and towards costa; a black line on submedian fold till near vein 2, and in some specimens traces of such a line in cell below upper median; traces of a medial black irrorated line; a black line on discocellulars, often interrupted at middle; a postmedial rather broad line consisting of fuscous-black irroration, angled at vein 8, somewhat incurved between veins 5 to 8 and inwardly oblique from vein 5 to inner margin, between every vein from inner margin to vein 8 the line is curved inwardly, forming a dentate edge on outer side; some fuscous-black irroration before postmedial line along costa and some sprinkling below submedian fold; a moderate band of ground-colour following the postmedial line and from there the terminal area is well irrorated with fuscous-black; some black terminal lunules between the veins from 1*b*–8 and a black suffusion from 1*b* to postmedial line; cilia of ground-colour, irrorated, except at base, with fuscous-black; hind-wing hyaline white and with the veins irrorated with light buff; some terminal fuscous irroration, especially on the veins, from 1*a* to beyond apex; cilia light buff.

Female :—whole wing, except at base, irrorated with fuscous. Some specimens have on the fore-wing a brazil red (i) suffusion at the postmedial and inner-marginal area, in the female type the postmedial line consist mainly of a brazil red irroration sprinkled with black.

Underside :—fore-wing with the ground-colour as on upperside; a fuscous suffusion and irroration in cell, along costa and beyond postmedial line, which is indicated by a diffused irroration; terminal lunules less distinct and fuscous-black; a black suffusion on the costa at basal third; hind-wing as on upperside, but fuscous irroration above vein 8 to costa and terminal irroration narrower and less distinct.

Exp. Male type 33 mm.; female type 34·5 mm.; co-types 32–33 mm.

Hab. All but one specimen, eight in all, come from Umkomaas in 18–29. i. 1914.

This species is near to *D. perstrigata* Hmpsn. from Swaziland, from which it differs in the pectination of the antennae of the male becoming shorter at $\frac{3}{4}$ and absent on last $\frac{4}{5}$, and also in the postmedial line being distinct.

It must be placed in Hampson's Section II, *B*, but the fore-wing has 4, 5 from a point in some specimens, in others well apart.

Poliostola, gen. nov.

Type **phycitimorpha.**

Proboscis well developed; palpi obliquely upturned, just extending beyond frons; first and second joint of equal length, covered with long scales in front, third joint less than half of second, obtuse and covered with scales; frons rounded, smoothly scaled; maxillary palpi small, filiform; antennae of male with a tuft of scales on front of first joint, serrate and with two rows of cilia, longer than thickness of shaft and placed in bundles at each joint, diminishing towards tip; in female the cilia are about half of shaft; mid-tibia with two rounded bushy tufts of scales, mixed with some hairs; hind-tibia fringed with hairs on upperside and with two pairs of spurs of which the outer spur is a little over half of inner spur. Fore-wing rather broad, costa somewhat rounded, apex, termen and inner margin rounded; 1*b* well forked at base; cell a little over half of wing; vein 2 from $\frac{5}{6}$ of lower median; 3 and stalk of 4, 5 from lower angle; stalk of 4, 5 nearly $\frac{1}{4}$ of 4; discocellulars erect, curved; 6 from below upper angle; 7, 8, 9 stalked and from upper angle; 7 from nearly $\frac{1}{4}$ of 9; 8 from nearly middle of 9; 10 from well beyond upper angle and slightly approximated to stalk of 7, 8, 9; 11 and $\frac{2}{3}$ upper median, curved towards 10 at base; 12 parallel to upper median and vein 11. Hind-wing large, semicircular; 1*a* curved; 1*b* straight; 1*c* slightly curved and parallel to vein 2; cell short, less than half of wing owing to the discocellulars curving much inwardly; lower median from beyond middle of wing; 2 from $\frac{1}{5}$ of lower median; 3 shortly stalked with stalk of 4, 5 and from lower angle; 4, 5 stalked for nearly $\frac{1}{3}$ of 4; upper median far less than half of wing; 6 from upper angle, very shortly stalked with 7 and curved towards 5; 7 curved at basal third towards 8; 8 anastomosing with half of upper median, then free and approximated to 7 beyond upper angle; lower discocellular very oblique inwardly and long, upper discocellular oblique outwardly and only half the length of lower discocellular.

This genus is near *Pyralis*, but the palpi are rather shorter, second joint with scales in front and less curved; cilia of male antennae very long; hind-tibiae with fairly long hair above; fore-wing with vein 3 from angle; hind-wing with 3 from angle, even slightly stalked with stalk of 4, 5; 6 very shortly stalked with 7, almost from a point.

Poliostola phycitimorpha, sp. n.

Male and female. Head, palpi, first joint of antennae and shaft of antennae in female, thorax, abdomen on upperside warm buff (xv) tinged here and there with tawny (xv); palpi, frons and sides of head well tinged with tawny; shaft of male antennae black; thorax and abdomen on underside tinged and irrorated with black; fore femora vinaceous-rufous (xiv); tibia and tarsi heavily irrorated with black; mid- and hind-legs black, ringed with ochraceous-buff, broadly at femora, narrower on tibiae and very narrowly at the end of each joint; spurs light ochraceous-buff, tipped and edged outwardly with black. Fore-wing with the ground-colour pinkish-cinnamon (xxix), but for the greater part of costal and terminal area tinged and irrorated with fuscous (xlvi) except the base of wings, the area between medial and postmedial line below submedial fold, a fascia from apex to postmedial line at vein 6, and a narrow line beyond postmedial to inner margin; medial line made distinct by glaucous-green (xxxiii), scales before and beyond it in the dark costal area, but continued as a fuscous fascia beyond submedial fold; the line is curved from middle of costa to lower median, where it is slightly indented, then obliquely curved to 1*b* at $\frac{1}{3}$, where it is again indented, then well curved to inner margin; reniform of ground-colour, narrowly edged with black and broadly surrounded by glaucous-green scales; postmedial line indicated at dark costal area by glaucous-green scales beyond it as far as vein 6, then more sharply defined on ground-colour by its fuscous-black colour, dentated outwardly on the veins and curved inwardly between veins 1*b* to 2 and sharply angled inwardly below 1*b*; a fuscous-black subterminal line from vein 7, where it forms a streak on the vein and a broad patch below vein 6, then somewhat angled on the veins and parallel to postmedial from which it is separated by the ground-colour; a glaucous-green scaling between subterminal and terminal lines, which is black and broadest near apex; cilia vinaceous-rufous at base, then a double fuscous fascia of which the inner one is broadest and tipped with fuscous; glaucous-green scales between the fascia. Hind-wing whitish; a fuscous irrorated postmedial line from costa to 1*c*, much angled at vein 4; some fuscous irroration beyond it at costa; a terminal fuscous irroration from costa to 1*a*, fainter but broader between veins 3 and 1*c*; cilia whitish with an indistinct fuscous fascia across from apex to 1*c* and tipped with fuscous.

Underside:—ground-colour of both wings whitish; fore-wing densely irrorated with black and fuscous from costa to below lower median as far as discocellulars and from costa to vein 6 as far as

postmedial line; apical costal area tinged with pinkish buff (xxix) and thinly irrorated with fuscous-black; postmedial line fuscous as above, but not dentated and paler, ceasing before 1*b*; some thin fuscous irroration beyond it leaving a whitish fascia between them; a fuscous-black terminal line with whitish points on the veins; cilia whitish at base, then fuscous and with three pale narrow lines across it. Hind-wing with some thin irroration of fuscous along costa as far as postmedial line, which is as on upperside, but paler; some fuscous-black apical irroration, continued along termen till near tornus; cilia as above.

Exp. Male type 30 mm.; female type 31·5 mm.; male co-types 28 mm.

Hab. Types from Umtali (S. Rhodesia), 4. i. 1918; co-types 4–8. i. 1918; one female in damaged condition from Warmberg (Zoutpansberg distr.), 12. xii. 1906; in all five specimens.

II. *New or Little-known Exotic* Tipulidae (Diptera).

By Prof. Charles P. Alexander, F.E.S.

[Read October 19th, 1921.]

During the course of the writer's studies on the crane-flies of tropical America, a large number of undescribed species were discovered, some of which are discussed in the present paper. The material studied was received from several sources, the more important of which are as follows: British Museum of Natural History, through the kindness of Mr. Edwards; Hungarian Museum, through Dr. Kertész; and the Vienna Museum, through Dr. Zerny. The latter collections were of especial importance in that they contained the type specimens of many species described by Wiedemann, Schiner and Loew. Some of the species of the genus *Eriocera* described by Wiedemann and Schiner are re-described from these types. The location of the types of the novelties discussed herein is mentioned in connection with each species. The writer would express his thanks to Mr. Edwards, Dr. Kertész and Dr. Zerny for the privilege of examining these important collections of Neotropical Tipulidae.

Geranomyia (Geranomyia) lacteitarsis, sp. n.

Head grey; mesonotum shiny, dark brown, the praescutum paler medially; pleura yellow with a very broad and conspicuous dark brown longitudinal stripe; legs pale brown, the posterior tarsi cream-colour; posterior metatarsi flattened; wings strongly infumed, the costal, subcostal, and radial cells with subhyaline centres; cell 1*st R*1 very wide at base; abdominal tergites dark brown, sternites light yellow, variegated with brown.

Male.—Length (excluding the rostrum) 6·8 mm.; wing 6·4 mm.; rostrum alone 3·9 mm.

Rostrum elongate, exceeding the combined head and thorax, dark brownish black, paler basally; palpi brown. Antennal scape obscure testaceous yellow, flagellum dark brown; flagellar segments elongate-cylindrical. Vertex between the eyes very narrow, reduced to a capillary strip; head dark, pruinose, the anterior part of vertex more yellowish.

Mesonotal praescutum shiny with faint metallic reflexions, the median area back to the suture pale; lateral stripes dark brown, confluent with the dark-brown remainder of the mesonotum; the pale colour of the anterior part of the praescutum may be abnormal as this region of the thorax appears to be quite hollowed out inside. Pleura yellow with a very broad and conspicuous dark-brown longitudinal stripe, beginning dorsad of the fore coxa, passing caudad to the abdomen; mesosternum abruptly yellow. Halteres yellow, the knobs conspicuously dark brown. Legs with the coxae and trochanters yellow; femora greenish yellow, the tips indistinctly darkened; tibiae pale brown; tarsi pale brown, the terminal tarsal segments conspicuously paler, on the posterior legs beyond the metatarsi light cream-colour; posterior metatarsi very broad and flattened; claws small, each with five basal teeth which decrease in size basad. Wings broad, subspathulate, the base strongly petiolate; membrane strongly infumed, conspicuously variegated with dark brown and subhyaline; the subhyaline areas include most of cells *C*, *Sc*, *Sc*1, *R* and 1*st R*1; small brown clouds at arculus, at the supernumerary cross-vein in cell *Sc*, at origin of *Rs* and at the stigma, the latter small, oval; the second brown area is confluent behind with the ground-colour; the third area is connected with the ground-colour by a narrow seam along *Rs*; the subhyaline areas thus appear as conspicuous blotches in cells *Sc*1, *R*, and 1*st R*1; base of wing pale; veins dark brown, yellow in the subhyaline areas. Venation: *Sc* rather short, ending about opposite one-fourth the length of *Rs*, Sc2 not far removed from tip of *Sc*1; *Rs* of moderate length, almost straight but very oblique in position so cell 1*st R*1 is greatly widened at its proximal end; *r* at tip of *R*1; *r—m* short, about one-half *m*; cell 1*st M*2 elongate-rectangular, gently widened distally, the veins beyond it short, *Cu*1 beyond it being about equal to the basal deflection of *Cu*1, the latter at the fork of *M*.

Abdominal tergites dark brown; sternites light yellow, the caudal margins of the segments narrowly darkened.

Hab. Colombia.

Holotype, ♂, Condoto, September 14, 1913 (*Dr. H. G. F. Spurrell*).

Type in the collection of the British Museum (Natural History).

Peripheroptera angustifasciata, sp. n.

Head black; mesonotal praescutum yellowish pollinose with three broad black stripes; wings yellowish; stigma elongate, dark

brown; conspicuous, broad, brown seams at arculus and along the cord; cell 1*st* *M*2 closed; basal deflection of *Cu*1 beyond the fork of *M*.

Female.—Length 6 mm.; wing 8 mm.

Rostrum and palpi dark brown. Antennae brownish black. Head black.

Pronotum dark brown. Mesonotal praescutum yellowish pollinose with three very broad shiny black stripes that are approximated or subconfluent near the suture; scutum reddish brown, the lobes black; scutellum reddish brown; postnotum black medially. Thoracic pleura with the cephalic half black, the caudal half reddish brown. Halteres brown, the base of the stem yellowish. Legs with the coxae reddish brown; trochanters obscure yellow; remainder of the legs dark brown, the femoral bases brighter. Wings yellowish, the stigma elongate, dark brown; conspicuous, broad, brown seams along the cord, at *Sc*2, the outer end of cell 1*st* *M*2 and at arculus; cell *Sc*1 proximad of the cord infuscated, becoming paler distally; wing-tip faintly darkened; veins brown. Venation: *Sc*1 ending immediately before the origin of *Rs*, *Sc*2 far from the tip of *Sc*1, *Sc*1 alone about two and one-half times *Rs*; *Rs* arcuated, a little longer than the deflection of *R*4 + 5; *r* elongate, arcuated, at tip of *R*1; inner ends of cells *R*3, *R*5 and 1*st* *M*2 approximately in alignment; cell 1*st* *M*2 closed; basal deflection of *Cu*1 immediately beyond the fork of *M*; arculus at about one-fourth the wing-length; cell 2*nd* *A* long and narrow.

Abdomen brown, the caudal margins of the tergites narrowly obscure yellow; anterior angles of the first abdominal tergite brighter yellow.

Hab. Venezuela.

Holotype, ♀, from the old collection of the Vienna Museum.

Type in the collection of the Vienna Museum.

Peripheroptera glochinoides, sp. n.

General coloration shiny black; legs with the femora obscure brownish yellow, the tips brown; wings subhyaline, stigma oval, dark brown; *Sc*2 near mid-length of the distance between arculus and origin of *Rs*; *r* nearly twice the length of *R*1 beyond it, about equal to *m*.

Female.—Length 7 mm.; wing 7·1 mm.

Rostrum and palpi dark brownish black. Antennae black; basal flagellar segments globular, the terminal segments oval. Head black.

Pronotum black, pollinose laterally. Mesonotum shiny black,

the lateral portions pollinose. Pleura black. Halteres yellow, knobs brown. Legs with the coxae black, sparsely pollinose; trochanters black; femora obscure brownish yellow, the tips passing into dark brown; tibiae brown, the tips darkened; tarsi brown. Wings subhyaline; stigma oval, dark brown; narrow, pale brown seams along the cord and outer end of cell 1*st M*2; cells *C* and *Sc* at the wing-base a little yellowish; veins brown. Venation: *Sc*1 ending opposite the origin of *Rs*, *Sc*2 very far from the tip of *Sc*1, being about mid-distance between arculus and the origin of *Rs*; *Rs* arcuated, nearly four times *r*; *r* near extreme tip of *R*1, on *R*2 + 3 about twice its length beyond the fork of *Rs*; deflection of *R*4 + 5 strongly arcuated; cell 1*st M*2 closed, about as long as vein *Cu*1 beyond it; basal deflection of *Cu*1 immediately before the fork of *M*; anal angle feeble; basal cells of wing not conspicuously developed.

Abdominal tergites dark brownish black, the pleural membranes paler.

Hab. Venezuela.

Holotype, ♀, 1864 (*Lindig*), "Novara Reise."

Type in the collection of the Vienna Museum.

Peripheroptera glochinoides is related to *P. teucholaboides* Alexander (Peru), differing in the colour of the legs and the venational details, such as the position of *Sc*2 and the length and position of the radial cross-vein.

Rhamphidia rubicunda, sp. n.

Similar to *R. sanguinolenta* Alexander; wings with *r*—*m* obliterated by the contact of *R*4 + 5 on *M*1 + 2.

Male.—Length about 5·8 mm.; wing 5·8 mm.

Generally similar to *R. sanguinolenta* Alexander (Amazonian Peru), differing as follows:

Thoracic pleura concolorous with the mesonotal praescutum. Femoral tips very gradually darkened, not abruptly as in *sanguinolenta*. Wings with no brown seam along vein 2*nd A* or the outer end of cell 1*st M*2; seams along the cord less distinct; *r*—*m* obliterated by the punctiform contact of *R*4 + 5 on *M*1 + 2, the basal deflection of *R*4 + 5 being a little longer, the deflection of *M*1 + 2 much longer than in *sanguinolenta*; cell 1*st M*2 large, irregularly pentagonal; basal deflection of *Cu*1 immediately beyond the fork of *M*.

Abdomen more uniformly reddish.

Hab. Paraguay.

Holotype, ♂, San Bernardino (*Fiebrig*); on leaves in woods.

Type in the collection of the Vienna Museum.

Erioptera winthemi, sp. n.

General coloration ashy grey, the mesonotal praescutum with three indistinct brown stripes; wings subhyaline with three broad cross-bands that appear as pale washes; cell 1*st M*2 open by the atrophy of *m*.

Female.—Length about 5·3 mm.; wing 5·7 mm.

Rostrum and palpi brown. Antennae with the first scapal segment dark, the flagellum bright brown. Head ashy grey.

Mesonotal praescutum ashy grey with three more or less confluent, indistinct brown stripes, the broad median stripe evanescent anteriorly; pseudosutural foveae conspicuous, elongate, black; remainder of mesonotum light ashy grey. Pleura ashy grey. Halteres broken. Legs with the coxae brown, pruinose; remainder of the legs dark brown. Wings subhyaline, with three indistinct, broad, brown cross-bands that appear as faint washes; the first of these bands occupies the level of the origin of *Rs*; the second lies immediately beyond the cord, beginning at the stigma, fading out posteriorly; the last band includes the comparatively narrow wing-tip; these brown washes are produced by the increase in size and density of the microtrichiae at these points; veins dark brown. Venation: *Sc*2 very faint to almost lacking; *R*2 + 3 and deflection of *R*4 + 5 subequal; *r* on *R*2 a little more than its length beyond the fork; cell 1*st M*2 open by the atrophy of *m*; cell *M*3 very deep; basal deflection of *Cu*1 immediately before the fork of *M*; vein 2*nd A* straight.

Abdomen dark brown, the ovipositor and genital segment reddish horn-colour. Tergal valves of ovipositor powerful, slightly upcurved to the acute tips.

Hab. Brazil.

Holotype, ♀, Ex the Winthem Collection.

Type in the collection of the Vienna Museum.

Molophilus quadristylus, sp. n.

General coloration dark brown; antennae of the male not elongate; wings with a brown tinge; male hypopygium with four apparent ventral appendages, these elongate, stylet-like, straight or gently sinuous.

Male.—Length about 3·3 mm.; wing about 4·3 mm.

Rostrum and palpi brown. Antennae not elongate, pale brown, the flagellar segments with long verticils, those of the basal segments longest. Head brown.

Pronotum brown, the lateral ends of the scutellum obscure yellow. Mesonotal praescutum dark brown, the humeral region obscure yellow; remainder of the mesonotum dark brown. Pleura dark brown, in fresh material probably more or less pruinose. Halteres light brown, paler basally. Legs with the coxae and trochanters obscure yellow; remainder of the legs dark brown, the femoral bases broadly paler. Wings relatively long and narrow, with a brownish tinge; veins darker brown, clothed with long, dark brown trichiae. Venation: $R2 + 3$ subangulate at r; deflection of $R5$ obliterated or nearly so, $r-m$ connecting close to the fork.

Abdominal tergites dark brown, the sternites paler, the penultimate tergite brighter. Male hypopygium with four long, almost straight, stylet-like rods, pale in colour, the tips blackened, two on either side of the body together with a third of approximately one-half the length; the stoutest of the styli bears about six setae along its inner margin, the apex on the outer margin with a few appressed teeth; the second stylus is of approximately the same length but smoother and more slender, gently sinuous; the short spine is pale, broad-based, tapering gradually to the acute tip. Penis-guard straight, near the tip bent laterally at a right angle.

Hab. Brazil.
Holotype, ♂, Ex the Winthem Collection.
Paratopotypes, 4 ♂'s.
Type in the collection of the Vienna Museum.

Molophilus remiger, sp. n.

General coloration light brown; antennae of the male not elongate; halteres yellow; wings pale yellowish; male hypopygium with the apparent ventral appendages elongate, the apex dilated into a fimbriate blade.

Male.—Length about 4 mm.; wing 5·4 mm.

Rostrum and palpi brown. Antennae pale brown; flagellar segments of the male oval, provided with an erect pale pubescence and a few verticils. Head pale ochreous brown.

Pronotum whitish, the scutellum reddish brown on the sides. Mesonotal praescutum light rusty brown, this produced by the confluence of the usual stripes; lateral margins narrowly whitish; pseudosutural foveae elongate, black, margined with pale; remainder of the mesonotum pale yellowish brown, sparsely pruinose. Pleura

largely destroyed in pinning, apparently pale with a sparse pruinosity. Halteres yellow. Legs with the coxae, trochanters, femora and tibiae yellow, the tips of the latter narrowly darkened; metatarsi brownish yellow, the tips and remainder of the tarsi dark brown. Wings with a yellowish tinge; veins pale brownish yellow, provided with conspicuous pale brown trichiae. Venation as in the subgenus.

Abdominal tergites dark brown, the sternites slightly paler. Male hypopygium with the two apparent ventral appendages of a length and shape unlike any other species known to the writer, each appearing as an elongate, gently curved rod that is slightly expanded into a blade-like portion at its distal end, the proximal margin provided with a series of peg-like spines and long bristles, the extreme tip produced into a powerful spine. The appendages at the tips of the pleurites are powerful, deeply bifid at apex, near the base with a small appressed spine. Penis-guard an elongate, straight, pale rod.

Hab. Brazil.
Holotype, ♂, Ex the Winthem Collection.
Type in the collection of the Vienna Museum.

Cryptolabis sepulchralis, sp. n.

General coloration brown; wings with a strong brown suffusion; *Rs* elongate, between three and four times *R*2 + 3; wing-surface, except the base, provided with abundant macrotrichiae.

Male.—Length about 3·6 mm.; wing 4·8 mm.

Rostrum and palpi brown. Antennae with the scapal segments dark brown; flagellum brown, the segments with conspicuous verticils. Front and anterior part of vertex yellow, the remainder of the vertex dark brown; vertex between the eyes compressed and elevated, this condition possibly due to drying.

Pronotum yellow. Mesonotal praescutum dark liver-brown with a sparse pollen, the lateral margins narrowly yellowish; remainder of mesonotum dark brown. Pleura dark brown, sparsely pruinose. Halteres dark brown, the extreme base of the stem yellowish. Legs with the fore coxae brown, the other coxae obscure yellow; trochanters testaceous; femora and tibiae brown, the tips dark brown; tarsi dark brown. Wings with a strong brown suffusion, the stigmal region a little darker; veins slightly darker brown. Venation: *Sc* long, *Sc*1 ending about opposite mid-length, or beyond, of *R*2 + 3; *Sc*2 not apparent; *Rs* unusually long for a member of this genus, between three and four times *R*2 + 3; *r* far from the tip of *R*1, on *R*2 about its own length beyond the

fork of *R*2 + 3; *R*2 + 3 a little longer than the deflection of *R*4 + 5; *r*−*m* slightly longer than the basal deflection of *R*4 + 5; basal deflection of *Cu*1 inserted immediately before the fork of *M*3 and *Cu*1, the fusion of the latter punctiform. Almost the entire wing-surface is covered with conspicuous macrotrichiae, this including all the cells beyond the cord, all of cells *R* and *M* except the bases, the distal fourth of cell *Cu* and the distal half of the Anal cells.

Abdomen dark brown. Male hypopygium small but not concealed within the body as in other species of the genus.

Hab. Paraguay.
Holotype, ♂, San Bernardino (*Fiebrig*).
Paratopotype, ♂.
Type in the collection of the Vienna Museum.

Gonomyia (Progonomyia) dolorosa, sp. n.

General coloration black; thoracic pleura with a narrow white longitudinal stripe; legs brownish black; wings suffused with brown, the stigma darker brown; *Sc* long, *Sc*2 some distance before the tip of *Sc*1; male hypopygium with three black pleural appendages.

Male.—Length about 6 mm.; wing 6·2 mm.

Female.—Length about 6·5 mm.; wing 6·3 mm.

Rostrum and palpi black. Antennae black, the distal flagellar segments elongate. Head dark, grey pruinose.

Pronotum broadly black medially, paler laterally. Mesonotum black; humeral region and lateral margins narrowly whitish; a whitish area on the postero-lateral portions of the praescutum; median area of scutum and the scutellum suffused with reddish. Pleura brownish black with a narrow white longitudinal stripe occupying the dorsal margin of the mesosternum, beginning immediately behind the fore coxae passing above the mid-coxae, ending at the posterior coxae. Halteres obscure whitish testaceous, the knobs darker. Legs dark brownish black, the coxae paler terminally. Wings with a strong brownish suffusion, the stigma darker brown, oval; veins dark brown. Venation: *Sc* long, *Sc*1 ending opposite mid-length of *Rs*, *Sc*2 some distance from the tip of *Sc*1, *Sc*1 alone a little longer than the basal deflection of *Cu*1; *r* faint, inserted at about four-fifths the length of *R*2 + 3, the latter a little shorter than the petiole of cell *2nd M2*; basal deflection of *Cu*1 a short distance before the fork of *M*.

Abdomen black, the tergites very narrowly margined caudally with paler. Male hypopygium black; pleurites triangular, the apex of each produced into a short black point; three dark-coloured

pleural appendages; outer appendage broad-based, gradually narrowed into a curved apical point or hook; intermediate appendage cylindrical, the terminal two-fifths produced into a slender spine that is inserted on the proximal edge of the basal section; inner appendage dark, subrectangular, provided with numerous setae. Penis-guard conspicuously trifid at apex.

Hab. Brazil.

Holotype, ♂, Young, Iguape (Bras. Exped. Wettstein, 1891).

Allotopotype, ♀.

Type in the collection of the Vienna Museum.

Gonomyia (Progonomyia) peruviana, sp. n.

Closely related to *G. velutina* Alexander; mesonotal praescutum grey with three brown stripes; pleura striped longitudinally with yellow; wings subhyaline, sparsely spotted with brownish grey; *Sc*1 ending opposite mid-length of the long sector; male hypopygium with the intermediate appendage a long, straight, chitinised rod that tapers to the acute point, before the middle of its length with a small, acute, lateral point.

Male.—Length about 5·5 mm.; wing, 6·3 mm.

Rostrum and palpi dark brown. Antennae moderately elongated, dark brownish black. Head dark coloured, light grey pruinose.

Pronotum grey, dark brown medially. Mesonotal praescutum light grey with three dark brown stripes, the median stripe broader than the lateral stripes; pseudosutural foveae large and conspicuous. Pleura brownish grey with a broad, longitudinal, light yellow ventral stripe, the mesepimeron similarly coloured. Legs light brown, the tips of the femora slightly darker. Wings subhyaline; stigma oval, pale brown; conspicuous brownish grey clouds arranged as follows: along the cord; at *m*; at the origin of *Rs*; in cell *M* at two-thirds its length; near the base of cell *Cu*1 and near the end of cell 1*st A* at the end of vein 2*nd A*; veins dark brown. Venation: *Sc* long, Sc1 ending beyond mid-length of the long *Rs*, *Sc*2 some distance from the tip of *Sc*1, the latter vein alone being a little longer than the basal deflection of *Cu*1; *Rs* long, gently arcuated; *R*2 + 3 a little shorter than *R*2; *r* near two-thirds the length of *R*2 + 3; *R*2 less than one-half R3; deflection of *R*4 + 5 arcuated; cell 1*st M*2 open; basal deflection of *Cu*1 about one-half its length before the fork of *M*.

Abdomen dark brown. Male hypopygium with the outer pleural appendage chitinised, curved, the comparatively long apex ending in an acute point; intermediate pleural appendage a very long,

slender, chitinised rod that bears a small, slender spine on the outer face just before mid-length, the long, acute point slightly curved near the tip; inner pleural appendage a subflattened lobe that is slightly arcuate, the proximal face set with setigerous punctures. Penis-guard sparsely trifid at apex.

Hab. Peru.

Holotype, ♂, Matucana, altitude 7788 feet, April 22, 1913 (*C. H. T. Townsend*).

Type in the collection of the writer.

The type of *G. peruviana* was formerly included in the type-material of *G. velutina* as a paratype, and is the species that is figured in the original description of the latter species (Trans. Am. Ent. Soc., vol. 42, pl. 2, fig. 9; 1916; true *velutina* is shown in fig. 10). The two species differ in the details of structure of the male hypopygium.

Gonomyia (Progonomyia) serena, sp. n.

General coloration yellowish buff; mesonotal praescutum with three brown stripes; head grey; wings with a faint yellowish tinge, stigma subcircular, pale brown; *Sc*2 lying before the origin of *Rs*; intermediate pleural appendages of the male hypopygium at near mid-length dilated into a collar which is produced into a slender, cylindrical rod.

Male.—Length about 6 mm.; wing 6·6 mm.

Female.—Length about 6·5 mm.; wing 6·8 mm.

Rostrum obscure brownish yellow; palpi dark brown. Antennae dark brown throughout. Head grey.

Mesonotal praescutum yellowish buff with three conspicuous brown stripes, the median stripe broadest, complete; scutal lobes brown, median area pale; scutellum obscure yellow with a narrow, brown, longitudinal line on either side of the median vitta; postnotum injured in type. Pleura brownish plumbeous with a conspicuous, ventral, whitish longitudinal stripe as usual in the subgenus. Halteres pale, knobs darker brown. Legs with the coxae pale, fore and middle coxae slightly infuscated; trochanters pale; femora, tibiae and metatarsi obscure yellow, the tips narrowly darkened; remainder of tarsi dark brown. Wings with a faint yellowish tinge; stigma subcircular, pale brown; origin of *Rs* and the cord very indistinctly seamed with brown; veins dark brown. Venation: *Sc* short, *Sc*1 ending about opposite one-fourth *Rs*, *Sc*2 lying proximad of the origin of *Rs*; *Sc*1 alone about one-third longer than the basal deflection of *Cu*1; *Rs* angulated and spurred at

origin; *r* at two-thirds the rather long *R*2 + 3; *R*2 + 3 as long as, or longer than, the petiole of cell 2*nd M*2, shorter than *R*2; basal deflection of *R*4 + 5 arcuated; basal deflection of *Cu*1 a short distance before the fork of *M*.

Abdominal tergites dark brown; sternites pale brownish yellow. Male hypopygium with three pleural appendages; outer appendage a short, flattened, curved blade, the apex produced into a blackened beak; intermediate appendage complex, with a cylindrical base that is dilated into a collar the outer angle of which is produced into a short, black, spinous lobe, the proximal angle produced into a straight, slender rod that is approximately as long as the base itself but very slender; inner pleural appendage very pale, fleshy, suboval, the proximal face with abundant stout setae. Penis-guard conspicuously trifid at apex. Ovipositor with the valves elongate, horn-coloured.

Hab. South America, without closer determination.
Holotype, ♂ (Ex the Winthem Collection).
Allotopotype, ♀, pinned with the type.
Type in the collection of the Vienna Museum.

Gonomyia (Leiponeura) subfalcifer, sp. n.

General coloration grey; scapal segments orange; pleura with two silvery white longitudinal stripes; legs with the femora yellow with a narrow brown subterminal ring; male hypopygium with the outer pleural appendage sickle-shaped and with a single chitinised spine on the proximal face.

Male.—Length about 3·8 mm.; wing 4·3 mm.

Rostrum and palpi dark brown. Antennae with the scapal segments obscure orange, the anterior face darker; basal flagellar segments pale, passing into darker brown at the tip of the organ; flagellar segments with long verticils. Head whitish, the centre of the vertex dark brown.

Pronotum pale, dark brown medially. Mesonotal praescutum brown, the median area slightly darker brown, the lateral margins broadly pruinose; scutum pruinose, the lobes brown; scutellum pruinose, the caudal margin pale; postnotum light grey pruinose. Pleura dark brown, grey pruinose, with two conspicuous silvery white longitudinal stripes, the ventral stripe wider and more clearly defined than the dorsal stripe, the dark stripe between very narrow but distinct; dorso-pleural membrane obscure brownish yellow. Halteres brownish yellow, the knobs broken. Legs with the coxae obscure yellow, dark brown basally; trochanters yellow; only the middle legs remain; femora yellow with a narrow brown

subterminal ring; tibiae yellow, the tips conspicuously blackened; metatarsi brown, the tips and remainder of the tarsi dark brownish black. Wings with a greyish yellow tinge; stigma small, circular, dark brown; veins brown. Venation: *Sc* short, *Sc*1 terminating a distance before the origin of *Rs* that is longer than *Rs* alone; basal deflection of *Cu*1 in alignment with $r-m$ and on *M* at or before the fork.

Abdomen dark brown, the caudal margins of the segments narrowly white, less distinct on the sternites. Male hypopygium very much as in *G.* (*L.*) *falcifer* Alex. (Amazonian Peru), but the outer pleural appendage with but a single subbasal spine, this latter with about four appressed teeth on the proximal face.

Hab. Paraguay.
Holotype, ♂, San Bernardino (*Fiebrig*).
Type in the collection of the Vienna Museum.

Gnophomyia funebris, sp. n.

General coloration black; flagellar segments feebly subserrate; legs and halteres black; wings with a strong brown tinge, the median half slightly paler; abundant macrotrichiae in the cells beyond the cord; *Sc*1 long.

Male.—Length about 9 mm.; wing 8·4 mm.

Rostrum and palpi black. Antennae black; intermediate flagellar segments narrow at base, the inner face at apex a little produced to give the organ a subserrate appearance. Head black.

Thorax black. Halteres and legs black. Wings with a strong brownish tinge, the middle half a little paler, the wing-base and apex being a little darkened; conspicuous macrotrichiae in cells *Sc*1, 1*st* and 2*nd* *R*1, *R*2, *R*3, *R*5, 1*st* *M*2, 2*nd* *M*2, *M*3, *Cu*1 and the ends of *Cu* and 1*st* *A*. Venation: *Sc*1 ending about opposite one-third the length of R2 + 3, *Sc*2 some distance from the tip of *Sc*1, the latter alone about two-thirds the basal deflection of *Cu*1; *Rs* elongate, almost straight; *R*2 + 3 about equal to the basal deflection of *Cu*1; *r* on *R*2 + 3 immediately before its fork; basal deflection of *R*4 + 5 angulate; $r-m$ oblique; proximal end of cell 1*st* *M*2 pale; basal deflection of *Cu*1 at about one-fifth the length of cell 1*st* *M*2.

Abdomen brownish black throughout. Male hypopygium of the type of *G. luctuosa* O.S.; pleurites stout, the outer lateral angle produced caudad and slightly proximad into a conspicuous digitiform lobe that is narrowed to the blunt apex. There appears to be but a single pleural appendage, this a little shorter than the

terminal lobe, rather stout, terminating in a short, acute spine that is placed laterally. Penis-guard rather stout, the extreme tip decurved into a short point.

Hab. Brazil.
Holotype, ♂, Bahia (*Fruhstorfer*).
Type in the collection of the Vienna Museum.

Gnophomyia melancholica, sp. n.

General coloration black; legs and halteres black; wings with a pale brown tinge, cells *C* and *Sc* slightly darker; stigma small, dark brown; distal cells of wing with comparatively sparse macrotrichiae; male hypopygium with a single, very complex pleural appendage that is divided into three arms.

Male.—Length about 8 mm.; wing 8·5 mm.

Rostrum and palpi black. Antennal scape black, the flagellar segments broken. Head black.

Thorax black. Halteres and legs black. Wings with a pale brownish tinge, cells *C* and *Sc* slightly darker brown; stigma comparatively small, dark brown; veins dark brown; conspicuous macrotrichiae in cells *Sc*1, 1*st* and 2*nd* *R*1, *R*2, *R*3, *R*5, 1*st* *M*2, 2*nd* *M*2, *M*3 and the outer end of cell *Cu*1; the macrotrichiae are confined to the centres and distal ends of the cells; no macrotrichiae in cells *Cu* or 1*st* *A*. Venation: *Sc*2 close to the tip of *Sc*1, the latter only a trifle longer than *Sc*2; *Rs* long, gently arcuated at origin; *R*2 + 3 short, about one-half the basal deflection of *Cu*1; *r* on *R*2 + 3 before the fork; basal deflection of *R*4 + 5 angulated near mid-length; basal deflection of *Cu*1 a short distance beyond the fork of *M*.

Abdomen black. Male hypopygium of the type of *G. luctuosa* O.S. Pleurites short and stout, with the single complex pleural appendage situated on the dorsal-proximal face; apex of each pleurite produced caudad and slightly proximad into a digitiform lobe, the extreme apex suddenly narrowed into a chitinised tip which bears about ten small setae on the proximal or cephalic face. Pleural appendage very complex, divided into three principal arms; dorsal arm appearing as a long, slender, curved spine, directed caudad and thence laterad, tapering gradually to the acute tip, the proximal edge delicately fringed with short, pale hairs; intermediate arm fleshy, more slender at base, the distal end dilated, the apex feebly bifid, the proximal face with abundant, long, yellow, erect setae; ventral arm a slender chitinised rod that bears a conspicuous chitinised spine on the lateral face some distance back

from the apex. Penis-guard comparatively small, triangular in outline, the small tip decurved.

Hab. Paraguay.
Holotype, ♂, San Bernardino (*Fiebrig*).
Type in the collection of the Vienna Museum.

Gnophomyia pammelas, sp. n.

General coloration deep velvety black; wings black, the centre of the disc noticeably paler; membrane beyond the cord with abundant macrotrichiae; *Sc*1 longer than the basal deflection of *Cu*1.

Female.—Length 9 mm.; wing 8·6 mm.

Rostrum and palpi black. Antennae black, the flagellar segments oval-cylindrical. Head black.

Thorax velvety black. Halteres and legs black. Wings black, the centre of the disc noticeably paler, this including most of cell 1*st R*1, the outer halves of cells *R* and *M*, the extreme bases of cells *R*3 and *R*5 and most of cell 1*st M*2; cells *C* and *Sc* black; veins black; abundant macrotrichiae in the cells beyond the cord and the ends of cells *Cu* and 1*st A*. Venation: *Sc*1 extending to opposite *r*; *Sc*2 far from the tip of *Sc*1, the latter alone about one-half longer than the basal deflection of *Cu*1; *r* on *R*2 + 3 at about two-thirds the length of the vein; cell 1*st M*2 relatively small, pentagonal, slightly widened distally; basal deflection of *Cu*1 immediately beyond the fork of *M*.

Abdomen black, including the ovipositor.

Hab. Paraguay.
Holotype, ♀, Trinidad, Asuncion, December 1920 (*F. Schade*).
Type in the collection of the writer.

Paratropesa amoena, sp. n.

General coloration purplish black; a narrow, transverse, yellow line on the pleura extending from the wing-root to the middle coxa; wings subhyaline with three conspicuous, dark brown cross-bands; cell 1*st M*2 closed, very long and narrow.

Sex (?).—Wing 6 mm.

Rostrum and palpi brown. Antennae with the scapal segments obscure yellow; flagellum broken. Head purplish brown, the front and inner margin of the eyes yellowish.

Pronotum yellow. Mesonotal praescutum black with purplish

reflexions, the humeral region narrowly obscure yellow; a small yellow spot above the wing-root; scutum destroyed by the pin; scutellum and postnotum dark. Pleura black with purplish reflexions; a conspicuous yellow cross-band extending from the wing-root to the mid-coxa. Halteres broken. Legs with the coxae and trochanters yellow; remainder of the legs broken. Wings subhyaline with three conspicuous, dark brown cross-bands, arranged as follows: the first in the bases of cells *R*, *M* and *Cu* and as a spot in cell 1*st A*; second band extending from the tip of *R*1 along the cord, this band broadest anteriorly, gradually narrowed posteriorly but wide and conspicuous for its entire length; terminal band occupying wing-tip, including cell *R*2, distal half of *R*3, a little less than the distal half of *R*5, most of 2*nd M*2 and the distal half of *M*3; cells *C* and *Sc* dark brown; veins dark brown. Venation: *Sc* ending a short distance beyond the origin of *Rs*; *Rs* very strongly arcuated; *r* at tip of *R*1 and on *R*2 + 3 a short distance beyond the fork of *Rs*; *R*2 + 3 longer than *R*3; *R*2 short, subperpendicular; cells 1*st M*2 very long and narrow, proximal end narrow, gradually widening distally, longer than the veins issuing from it; *m* about one-third shorter than the outer deflection of *M*3; basal deflection of *Cu*1 at the fork of *M*.

Abdomen broken.

Hab. Venezuela.

Holotype, Sex (?), "Kad.," August 1857.

Type in the collection of the Vienna Museum.

Paratropesa amoena differs from *P. fasciolaris* (Wiedemann) in the closed cell 1*st M*2. It is very distinct from all described species of the genus.

The type bears a label in Osten Sacken's writing: "Flügelgeäder von *Limnobia fasciolaris* W. und deshalb vielleicht nov. gen."

Toxorhina atripes, sp. n.

General coloration dark brown, the front and thoracic pleura silvery pruinose; legs brownish black; wings with a faint dusky tinge, most intense near the wing-apex; *Sc*1 ending about opposite one-fourth the length of *Rs*; basal deflection of *Cu*1 at or just beyond the fork of *M*.

Female.—Length (excluding the rostrum) 4·8 mm.; wing 4 mm.

Rostrum dark brown, if bent backward extending to about mid-length of the abdomen. Antennae dark brown. Front and anterior part of vertex silvery grey; remainder of head dark brown.

Mesonotum dark brown, unmarked. Pleura dark brown, con-

spicuously light grey pruinose. Halteres dark brown. Legs with the coxae testaceous, the basal half of each brownish grey; trochanters dark brown; remainder of legs brownish black. Wings with a faint dusky tinge, a little more saturated near the wing-tip; veins brownish black. Venation: *Sc*1 ending about opposite one-fourth the length of *Rs*; *R*1 ending about opposite three-fourths the length of *Rs*; *Rs* long, straight, about two and one-half times the basal deflection of *Cu*1; cell 1*st M*2 closed; outer deflection of *M*3 from one-third to nearly twice the length of *m*; basal deflection of *Cu*1 at or just beyond the fork of *M*; basal approximation of 1*st* A and *Cu* slight.

Abdominal tergites black, the sternites more brownish. Ovipositor with the valves long and slender.

Hab. Colombia.

Holotype, ♀, Condoto, June 27, 1913 (*Dr. H. G. F. Spurrell*).

Type in the collection of the British Museum (Natural History).

Ceratocheilus niveitarsis, sp. n.

Head dark brown, the front and anterior part of the vertex silvery grey; mesonotum dark clove-brown, the humeral regions of the praescutum abruptly citron-yellow; thoracic pleura yellow, the mesosternum and mesepisternum with a dark brown blotch; legs black, the tarsi largely snowy white; wings with a strong brown tinge; abdomen brown, variegated with obscure yellow; hypopygium yellow.

Male.—Length (excluding the rostrum) 5·5 mm.; wing 6 mm.; rostrum alone 3·6 mm.

Rostrum elongate, black, nearly one-half longer than the combined head and thorax. Antennae brownish black throughout, with twelve segments, the terminal segment minute; all flagellar segments with verticils, these becoming very long on the four subterminal segments; the second apparent flagellar segment is indistinctly fused with the first flagellar segment; flagellar segments three and four are deeply incised beneath to form two apparent segments, so the antenna may be interpreted as having fifteen segments, the three basal pairs of flagellar segments being narrowly connected on the dorsal side only. Front and anterior part of vertex and a broad margin around the eyes light silvery grey; remainder of vertex and occiput abruptly dark brown.

Pronotum dark brown above, obscure yellow laterally. Mesonotal praescutum with three confluent dark clove-brown stripes,

the humeral region and lateral margins broadly and conspicuously obscure citron-yellow; remainder of the mesonotum dark clove-brown, the median area of the scutum a little paler. Pleura yellow with a conspicuous purplish brown blotch occupying the sides of the mesosternum and the mesepisternum; mid-ventral area of mesosternum pale. Halteres obscure yellow, the knobs broken. Legs with the coxae yellow; remainder of the legs dark brownish black, the tips of the metatarsi and tarsal segments two to four snowy white, becoming more yellowish apically; terminal tarsal segment dark brown; setae on legs profoundly bifid as in genus. Wings with a strong brownish tinge; stigma not darkened; veins dark brown. Venation: *Sc* long, *Sc*1 ending beyond mid-length of *Rs*, the extreme tip atrophied; *Rs* moderately elongated, arcuated at origin, in direct alignment with the deflection of *R*4 + 5; *R*2 + 3 arising from the end of *Rs* at an angle, diverging from *R*4 + 5 toward the wing-margin; cell 1*st M*2 closed; *m* short, from one-third to one-fourth the outer deflection of *M*3; basal deflection of *Cu*1 a short distance beyond the fork of *M*, the distance about equal to *m*; *Cu*2 only a little more than one-half the basal deflection of *Cu*1.

Abdominal tergites brown, the caudal margins medially and the basal half of the lateral margins brownish black; posterior half of lateral margins brightened, sparsely pruinose; on the subterminal segments the coloration is largely black, producing a subterminal ring; sternites with the basal half of each segment dark brownish black, the posterior margins broadly yellowish; hypopygium yellow. Male hypopygium with the pleural appendages appearing to arise near the base of the inner face of the pleurite, bent dorsad and thence caudad, lying parallel, their tips divergent.

Hab. Colombia.

Holotype, ♂, Boca del Condoto, January 20, 1915 (*Dr. H. G. F. Spurrell*).

Type in the collection of the British Museum (Natural History).

Polymera tibialis, sp. n.

General coloration brown; mesonotal praescutum with four narrow brown stripes; antennae of the male elongate, annulate; thoracic pleura with a broad, dark brown stripe; legs brown, tips of the femora and the tibiae and tarsi white; wings yellowish brown, the cord narrowly seamed with darker brown.

Male.—Length 6·3 mm.; wing 7·2 mm.; antenna about 10 mm. Rostrum and palpi light brown. Antennae of the male very

elongate, one-half longer than the body; flagellar segments binodose, dark brown, the base and apex of the segments white to give the organ an annulated appearance; scape and first flagellar segment pale brown. Head brown.

Mesonotal praescutum light brownish grey with four narrow brown stripes; scutum light brown, the lobes with a narrow brown line, converging behind to the scutellum which is dark brown, paler posteriorly; postnotum brown, sparsely pruinose. Pleura obscure yellow with a broad, dark brown, pleural stripe, clearly delimited ventrally, more diffuse dorsally, extending about to the wing-root; mesosternum dark brown medially. Halteres obscure yellow, the knobs dark brown. Legs with the coxae yellowish testaceous, the fore coxa darkened basally; trochanters testaceous; femora brown, paler basally, the tips conspicuously white; tibiae white with a faint tinge of darker; tarsi of middle and hind legs white; fore legs broken. Wings with a strong yellowish brown tinge; *r* and the cord narrowly seamed with darker brown; veins brown. Venation: *r* on *R*1 far from the tip, the distal section of *R*1 a little longer than the petiole of cell *M*3; R2 + 3 about one-half longer than the deflection of *R*4 + 5; cell *M*1 small.

Abdominal tergites dark brown, the sternites slightly paler.

Hab. Brazil.

Holotype, ♂, Espirito Santo (Ex Coll. Fruhstorfer).

Type in the collection of the Vienna Museum.

Polymera tibialis is readily distinguished from all described species of the genus by the almost uniformly white tibiae.

Atarba fiebrigi, sp. n.

General coloration obscure yellow; antennae of the male moderately long, flagellar segments bicolorous; extreme tips of the femora darkened; wings with a faint yellowish tinge, the stigma barely indicated; *Sc*2 some distance from the tip of *Sc*1.

Male.—Length about 5·8 mm.; wing 6·8 mm.

Female.—Length about 6·4 mm.; wing 7 mm.

Rostrum obscure yellow; palpi yellowish brown. Antennae of male moderately elongate, if bent backward extending to beyond the base of the abdomen; scapal segments obscure yellow; basal flagellar segments bicolorous, the basal half obscure yellow, the distal half black, the amount of yellow decreasing on the outer segments, those toward the tip of the organ being uniformly blackened. Head yellowish grey.

Mesonotum obscure yellow without distinct markings, the base of the postnotum a little darker. Pleura obscure yellow. Halteres

yellow, the knobs brown. Legs obscure yellow, the extreme tips of the femora and the terminal tarsal segments darkened; tibial spurs present. Wings with a faint yellowish tinge; stigma barely indicated; veins pale brownish yellow. Venation: *Sc*1 ending opposite the origin of *Rs*, *Sc*2 some distance from the tip of *Sc*1, the latter alone about one-half longer than $r-m$; *Rs* rather short, gently arcuated; $R2+3$ straight; cell 1*st* *M*2 relatively small; basal deflection of *Cu*1 approximately at the fork of *M*, in some slightly basad of, in others slightly beyond this fork.

Abdominal tergites brown, the sternites obscure yellow; a subterminal brownish black ring in the male. Male hypopygium as in the genus. Penis-guard conspicuous, longer than the pleurites, moderately stout, the tip curved. Outer pleural appendage with appressed teeth, the apex produced into a spine. Ninth tergite small, the margin with a very broad V-shaped notch, the lateral angles appearing as divergent horns.

Hab. Paraguay.
Holotype, ♂, San Bernardino (*Fiebrig*).
Allotopotype, ♀, pinned with the type.
Type in the collection of the Vienna Museum.

Atarba punctiscuta, sp. n.

General coloration shiny yellow; antennae of the male moderately elongate; antennal flagellum almost uniformly dark brown; mesonotal praescutum with a narrow, dark brown, median line; each scutal lobe with two dark brown blotches; femora with a narrow brown subterminal ring; wings yellow, the cord narrowly seamed with brown; abdomen obscure yellow with a conspicuous black subterminal ring.

Male.—Length 5·3 mm.; wing 5·5 mm.

Rostrum obscure yellow; palpi brown. Antennae of moderate length, if bent backward extending to just beyond the base of the abdomen; scapal segments yellow, flagellum dark brown, only the extreme bases of flagellar segments one to three indistinctly brightened. Head yellow; centre of the vertex slightly darkened.

Mesonotal praescutum shiny yellow with a conspicuous dark-brown median stripe, broadest anteriorly, becoming obliterated at the suture; scutum yellow, each lobe with a large, dark-brown blotch occupying the latero-cephalic third and a smaller similar area on the proximo-caudal third; the pin passes through this part of the body and it cannot be determined whether these two latter areas are confluent across the median line; scutellum testaceous yellow; postnotum with the median sclerite brown, the lateral

sclerites yellow. Pleura yellow. Halteres yellow, the knobs brown. Legs with the coxae and trochanters yellow; femora yellow with a narrow brown subterminal ring; tibiae yellow, the extreme base darkened; terminal tarsal segments dark brown; tibial spurs present. Wings with a strong yellowish tinge; stigma darker yellow, oval; very narrow dark brown seams at the origin of *Rs*, along the cord and outer end of cell 1*st M*2; veins yellow, dark brown in the infuscated areas. Venation: *Sc*1 ending a short distance beyond the origin of *Rs*, *Sc*2 a short distance before this origin; *Rs* short, arcuated at origin, about one-half longer than the deflection of *R*4 + 5; *R*2 + 3 almost straight; veins *R*2 + 3 and *R*4 + 5 slightly divergent; cell 1*st M*2 closed; *m* shorter than *r*—*m*; basal deflection of *Cu*1 at or immediately before the fork of *M*.

Abdomen obscure yellow, the tergites indistinctly marked with darker; a conspicuous black subterminal ring on segments seven and eight; hypopygium light yellow. Male hypopygium with the pleural appendages as in the genus, the teeth of the outer appendage very long and outspreading. Gonapophyses appearing as two elongate, filiform rods, parallel at base, the apices deflexed and divergent. Ninth tergite appearing as a narrow plate, the apex with a deep V-shaped notch, the lateral lobes terminating in laterally directed points.

Hab. Paraguay.
Holotype, ♂, San Bernardino (*Fiebrig*).
Type in the collection of the Vienna Museum.

Eriocera caminaria (Wiedemann).

1828. *Limnobia caminaria* Wiedemann; Aussereur. zweifl. Ins., Th. I, p. 31.

The true status of *Eriocera caminaria* has been in doubt since Schiner re-described the species in the "Reise Novara," p. 42. The holotype of *caminaria* and the material discussed by Schiner are before me, and it is readily apparent that Schiner's species has little in common with true *caminaria*. It is described elsewhere in this paper as a new species, *E. perlaeta*. The following re-description of Wiedemann's type is here given to supplement the rather brief original description.

The antennae of the type are lacking; a single leg persists (a fore leg, broken at the metatarsus).

Female.—Length about 10 mm.; wing 10·2 mm.

Fore leg, femur, 5·4 mm.; tibia, 6·3 mm.

Head entirely orange, the ventral surface only a little darker than

the vertex. Vertical tubercle broad and conspicuous but not bifid. Antennae with the scape obscure yellow; flagellum broken.

The thorax of the century-old type now appears almost uniformly dark brown but the three praescutal stripes are indicated. Halteres dark brown. Only the fore-leg remains; this is very short for the size of the fly, dark brown throughout, there being no indication of paler on either segment. Wings brown with a comparatively narrow white cross-band that lies entirely proximad of the cord, this not including the costal cell and ending immediately before the posterior margin at the end of vein 1*st A*; this band occupies the middle fifth of cell 1*st R*1 and the ends of cells *R*, *M* and *Cu*; the band is of nearly uniform width for its entire length or slightly narrower in cell 1*st* R1; in addition to this band there is a conspicuous whitish blotch in cell *R* before the origin of *Rs*; Anal cells slightly paler than the remainder of the wing-membrane; the costal margin is not brightened anywhere along its length; veins dark brown, paler in the white bands. Venation: *Sc*1 ending about opposite the fork of *Rs*, *Sc*2 not far from the tip of *Sc*1; *r* about twice its length from the tip of *R*1 and on *R*2 a short distance beyond the fork of *R*2 + 3; cell *M*1 lacking; basal deflection of *Cu*1 at about one-third the length of cell 1*st M*2; *Cu*2 a little shorter than the basal deflection of *Cu*1.

Abdomen with the basal half of each of the tergites shiny blue-black, the distal half opaque black. Ovipositor with the genital segment obscure reddish yellow; valves slender, dark brown, the tips broken.

Hab. Brazil (Ex the Winthem Collection).

Eriocera perlaeta, sp. n.

Male.—Length 11·8–12 mm.; wing 10·2–10·8 mm.

Female.—Length about 12·5 mm.; wing 10·5 mm.

Eriocera perlaeta is the species discussed by Schiner ("Reise Novara," p. 42) as *E. caminaria* (Wiedemann). The material at hand includes not only the specimens upon which Schiner based these observations, but also the type specimen of *E. caminaria*. From a comparison of these specimens it is very evident that Schiner's material represents an undescribed species of the genus. The present species differs from *caminaria* in the following respects:

Legs dark brown, the fore femora with an extensive yellowish area immediately beyond the base; middle and hind femora with a

light yellow ring before the broad tips, on the mid-femora this being very narrow, only about one-third the brown tip; on the hind femora the yellow ring is much broader and very conspicuous, being more than one-half the brown tips; tibiae lighter brown than the femora. Wings very different from those of *E. caminaria*, the pale band at the cord being narrower, entirely traversing the wing and including portions of cells 1*st M*2 and *Cu*1; in *E. caminaria* the band lies entirely before the cord as stated by Wiedemann; an interrupted subbasal whitish band includes a large area in the basal cells immediately before the origin of *Rs* and a larger but less distinct area occupying the basal two-thirds of cell 1*st A*; the cephalic portion of the base of the wing proximad of *h* and arculus conspicuously light yellow. Abdominal tergites three and four with their basal halves pearl-grey, a little broader on the fourth segment; on tergite two this pale coloration is less distinct and occupies only about the basal third of the segment. Genitalia in both sexes orange. In the male, the penis is very long and slender as described by Schiner, a similar condition obtaining in the other members of this group of species.

Hab. Colombia and Brazil.
Holotype, ♂, Colombia.
Allotype, ♀, Brazil.
Paratypes, 3 ♂'s, 1 Sex (?), Brazil and Colombia.
Type in the collection of the Vienna Museum.

Eriocera latissima, sp. n.

Schiner determined this species as being *E. longistyla* Alexander (as *erythrocephala* Fabricius, preoccupied). The differences from true *longistyla* are very considerable as indicated herewith:

Male.—Length 10 mm.; wing 10·8 mm.

Vertical tubercle higher than usual and with a slight median notch. Mesonotal praescutum brown, darker than the obscure yellow remainder of the mesonotum. Pleura brown, the lateral sclerites of the postnotum conspicuously yellow, this colour encroaching slightly on the mesepimeron. Legs dark brown throughout. Wings dark brown; the wing-band is very broad but incomplete, not including cells *C*, *Sc* or *Cu*; this band lies entirely before the cord and forms a subquadrate area extending from just beyond the origin of *Rs* to the general level of the cord and including portions of cells 1*st R*1, *R* and *M*, and the extreme base of cell *Cu*1; the 1*st Anal* cell is conspicuously pale, only the apex being darkened. The

2*nd Anal* cell is entirely dark. Venation: Cell 1*st M*2 rectangular; basal deflection of *Cu*1 a short distance beyond the fork of *M*. Abdomen orange; segments five to seven inclusive black.

What the author considers to be true *longistyla* (since it agrees in almost every respect with the brief type descriptions) has been discussed in another paper (Psyche, vol. 21, p. 39; 1914).

Hab. Venezuela.

Holotype, ♂, 1864 (Lindig), "Novara Reise."

Type in the collection of the Vienna Museum.

Erioptera taenioptera (Wiedemann).

1828. *Limnobia taenioptera* Wiedemann; Aussereur. zweifl. Ins., Th. I, pp. 28, 29.

The brief description may be supplemented by the following notes on Wiedemann's type.

The abdomen of the holotype is entirely gone; antennal flagellum and all but a single leg lost. This single leg is glued to the pin.

Sex (?).—Wing 16·4 mm. Tibia 18·8 mm.

The entire frons, vertex and dorsum of the occiput orange, the ventral surface of the head brown. Antennae with the first scapal segment orange, the second segment brown; flagellum broken. Vertical tubercle conspicuous, with a very broad and low V-shaped notch.

The entire thorax is dark brownish black, no signs of stripes being apparent in this century-old type. Halteres dark brown. Legs with the coxae and trochanters dark brown; the single leg that is glued to the pin is very remarkable for an *Eriocera*, more resembling certain species of *Trentepohlia* and *Tanypremna*; from its structure, however, there can be little doubt but that it belongs to the insect as described; the femora are apparently yellow with broad black tips; tibia with the basal three-fifths (11 mm.) black, the apical two-fifths (7·8 mm.) white; metatarsus with a little more than the basal half black, the remainder white; second and third tarsal segments white, the terminal segments a little darkened. Wings dark brown with a conspicuous yellow cross-band at the level of the cord, this including the end of cell *C*, intermediate portion of 1*st R*1, bases of cells *R*3, 1st *M*2 and *Cu*1, and apices of cells *R* and *M*. As stated by Wiedemann, the Anal cells are a very little paler than the remainder of the wing, but this is not at all conspicuous; veins dark brown, paler in the yellow cross-band. Venation: *Sc*1 alone about

equal to *r*–*m*; *R*1 beyond *r* only a little shorter than the basal deflection of *Cu*1; *R*2 before *r* about twice this cross-vein; cell M1 lacking; basal deflection of *Cu*1 at about one-third the length of cell 1*st M*2; *Cu*2 a little more than one-half of the deflection of *Cu*1.

Hab. Brazil (Ex the Winthem Collection).

Eriocera nigrochalybea, sp. n.

General coloration black with steel-blue reflexions; vertex fiery orange; legs black, the femoral bases yellow; wings dark brown; a conspicuous light yellow cross-band before the cord; base of cell *R* and most of cell 1*st A* pale; abdomen brownish black, the hypopygium and base of the second sternite brighter.

Male.—Length 12·3 mm.; wing 12 mm.

Rostrum and palpi brown. Antennae short, dark brown, the scapal segments brighter on their ventral faces. Vertex fiery orange, the remainder of the head orange; vertical tubercle relatively high, notched anteriorly.

Mesonotum entirely black with conspicuous steel-blue reflexions. Pleura concolorous, very sparsely pruinose. Halteres dark brown throughout. Legs with the coxae and trochanters brownish black; only a single leg (anterior) remains; this is dark brown with the basal quarter obscure yellow. Wings dark brown; a conspicuous arcuated light yellow band before the cord, beyond cell 1*st M*2 swinging distad and including the basal half of cell *Cu*1; this band extends from cell 1*st R*1 across the wing, reaching the posterior margin as a mere point at vein *Cu*2; cells *R*3 and *R*5 are entirely dark, cell 1*st M*2 similar except the extreme proximal angle; cell *R* is pale basally, this colour narrowly connected with the yellow band at the cord by a pale streak caudad of the sector; cell 1*st A* is largely pale, only the distal end narrowly darkened; veins dark brown, paler in the yellow areas. Venation: *Sc*1 ends just beyond the fork of *Rs*, *Sc*2 rather close to the tip of *Sc*1, the latter alone shorter than the deflection of *R*4 + 5; *r* on *R*2 about its own length beyond the fork of *R*2 + 3; basal deflection of *Cu*1 immediately beyond the fork of *M*.

Abdomen dark brownish black with steel-blue reflexions; second sternite obscure yellow on basal half. Male hypopygium small, obscure reddish brown.

The paratype is very similar to the type, but the femoral bases are not brightened.

Hab. Brazil.

Holotype, ♂.
Paratype, a broken specimen.
Type in the collection of the Vienna Museum.

Erioptera chrysoptera (Walker).

1856. *Limnobia chrysoptera* Walker; Ins. Saundersiana, vol. 1, Dipt., p. 438.

At the request of the author, Mr. Edwards has again examined the type of this handsome species in the British Museum collection. The type is now without antennae, legs and ovipositor. The venation and pattern is carefully delineated in a camera lucida drawing sent by Mr. Edwards. This shows *Sc*1 ending slightly beyond mid-length of *R*2 + 3; cell 1*st M*2 irregularly hexagonal, the proximal end a little wider than the distal end; basal deflection of *Cu*1 beyond the fork of *M*, the distance about equal to *m*. Mr. Edwards describes the wings as having the basal three-fourths clear orange-yellow without any dark clouding. The drawing indicates that the apical infuscation is heavier in the radial cells, becoming paler posteriorly.

Eriocera chrysopteroides, sp. n.

Generally similar to *E. chrysoptera*; size larger; general coloration, including the legs, black; wings light yellow, the apical quarter strongly infumed; an ill-defined paler brown cloud in the caudal cells of the wing.

Female.—Length about 22–23 mm.; wing, 16–18·8 mm.

Eriocera chrysopteroides is apparently closely allied to *E. chrysoptera* (Walker), differing in the following regards:

From Walker's measurements of his species, the present insect is considerably larger. General coloration, including the head, thorax and abdomen, black; the thorax dusted with brown. Legs dark brownish black throughout. Wings light yellow, the apical quarter strongly infumed, the proximal end of this band including all but the extreme base of cell *R*3, all of cells *R*5, 1*st M*2 and *Cu*1; an ill-defined paler brown cloud in the caudal cells of the wing, centring at vein *Cu*, including portions of cells *R*, *M*, *Cu* and 1*st A*. In the paratype, this infuscation is only a little paler than the dark apex and is connected with it; the clear yellow colour includes only cells *C*, *Sc*, the proximal three-quarters of 1*st R*1 and the base of *R*1. Valves of the ovipositor dark brown.

The lateral angles of the pronotal scutum project laterad as conspicuous slender tubercles.

Hab. Brazil.
Holotype, ♀.
Paratype, ♀.
Type in the collection of the Vienna Museum.

Eriocera pulchripes, sp. n.

1914. *Eriocera chrysoptera* Alexander; Ent. News, vol. 25, pp. 214, 215; not *E. chrysoptera* (Walker).

In an earlier paper cited above, *Eriocera pulchripes* was determined by the writer as being *E. chrysoptera* (Walker). From notes on the type of the latter made by Mr. Edwards and from a comparison with related species, it is evident that the present form represents a very distinct species of the genus. The insect is described and figured in the paper cited above, the description being added here for completeness.

Female.—Length 18·8 mm.; wing 13·6 mm.

Rostrum, palpi, antennae and head very deep black. Thorax black. Halteres short, black. Legs with the coxae and trochanters black; basal portion of femora dark brownish black, this dark base narrowest on the fore-legs, broadest on the hind-legs where it covers almost one-third of the segment, tip of femora black, the median portion bright yellow; tibiae and tarsi very dark brown. Wings bright golden yellow, the Anal cells grey; tip of wing from the cord outward dark brown. Abdomen black.

Hab. Bolivia.
Holotype, ♀, Coroico.
Paratopotype, Sex (?).
Type in the collection of the Hungarian Museum.

Eriocera tranquilla, sp. n.

Vertex orange; mesonotal praescutum yellowish grey with three dark brown stripes; thoracic pleura dark brown, this colour including the coxae and trochanters of the legs; wings light brown, sparsely variegated with light yellow, including a narrow transverse band at the cord; abdomen yellow, the first, fifth and sixth segments black.

Male.—Length 10·5 mm.; wing 9·8–10·2 mm.

Rostrum and palpi dark brown. Antennae short, light brownish yellow throughout. Vertex orange, the ventral surface of head passing into dark brown.

Mesonotal praescutum yellowish grey with three dark brown stripes; remainder of the mesonotum dark brown, the scutal lobes sparsely pruinose. Pleura dark brown. Halteres dark brown, the base of the stem narrowly paler. Legs with the coxae and trochanters dark brown; femora yellow, the tips rather broadly and conspicuously dark brown; the posterior legs show an indication of a pale brown, post-median band; tibiae obscure yellow, the tips rather narrowly darkened; tarsi brown. Wings light brown, sparsely variegated with light yellow; stigma slightly darker brown; a narrow yellow band along the cord, on the cephalic part of the wing lying mostly proximad of the cord, beyond cell 1*st M*2 lying a little more on the distal side of the cord in cell *Cu*1; a yellow spot at origin of *Rs*; yellowish seams along *r* and the outer end of cell 1*st M*2; costal and subcostal cells proximad of *h* light yellow; cell 1*st A* pale, only the distal end darkened; veins light brown, more flavous in the yellow areas. Venation: *Sc*1 ending opposite the fork of *Rs*; cell 1*st M*2 comparatively long and narrow, the proximal end somewhat arcuated; *m* only about one-half the outer deflection of *M*3; basal deflection of *Cu*1 at from one-third to one-fourth the length of cell 1*st M*2.

Abdomen with the first tergite dark brownish black; segment two yellow, the extreme base and apex ringed with black; segments three and four yellow, the caudal margins narrowly ringed with dark brown; segments five and six black, forming a subterminal ring; remainder of abdomen, including the hypopygium, obscure orange.

Hab. Brazil.

Holotype, ♂. The label reads "Brazil (Blumenau) Loth. Hetschko."

Paratopotype, ♂.

Type in the collection of the Vienna Museum.

Eriocera schineri, nom. nov.

1868. *Penthoptera fuliginosa* Schiner; "Reise Novara," p. 42; a species of *Eriocera*, non *E. fuliginosa* Osten Sacken (1859).

The type may be re-described. The condition is good except that there are no posterior and but one middle leg remaining.

Male.—Length 12·6 mm.; wing 11·2 mm.

Fore-leg, femur, 6·7 mm.; tibia, 8·1 mm.

Middle leg, femur, 7·7 mm.; tibia, 8 mm.

Rostrum and palpi black. Antennae black, if bent backward

not extending to the wing-basis. Head black; vertical tubercle very inconspicuous.

Mesonotum black, the praescutum faintly blue-black in certain lights. Pleura with a shimmering white pruinosity when viewed obliquely. Halteres dark brown. Legs dark brown; coxae with a conspicuous white pruinosity; fore femora immediately beyond the base with a conspicuous obscure yellow ring that is three or four times as wide as the dark femoral base; on the middle femora this ring is barely indicated, which would lead to the belief that it would be quite obliterated on the posterior femora. Wings with a faint brownish tinge, the costal region more saturated; stigma brown, very diffuse, including the end of cell *Sc*1, 1*st R*1, all of *R*2 and less distinctly the end of cell *R*3; veins brown. Venation: *Sc* long, *Sc*1 ending just beyond the fork of *Rs*, *Sc*2 about twice its length from the tip of *Sc*1; *Rs* long, gently arcuated; ultimate section of *R*1 about equal to $r - m$; basal section of *R*2 about one-half longer than *r*; deflection of $R4 + 5$ very short; cell *M*1 lacking; cell 1*st M*2 rectangular; basal deflection of *Cu*1 just before mid-length of cell 1*st M*2; *Cu*2 and the basal deflection of *Cu*1 subequal.

Abdominal tergites shiny black; second and third sternites obscure reddish at base; hypopygium black.

The type was collected in Venezuela in 1864 by Lindig. Type in the collection of the Vienna Museum.

Eriocera nigra (Wiedemann).

1828. *Limnobia nigra* Wiedemann; Aussereur. zweifl. Ins., Th. I, p. 27.

The type series is before me. This consists of three males and two females, one of the males being selected as lectotype.

Male.—Length 16 mm.; wing 16·5 mm.

Female.—Length 22–24 mm.; wing 16·5–20·8 mm.

Rostrum and palpi brownish black. Antennae short, black, if bent backward ending far before the origin of the wing. Vertical tubercle appearing as two, short, slightly diverging cones. Head brownish black, including the tubercles.

Thorax dark brown, the praescutal stripes faintly indicated in some specimens. Halteres and legs brownish black. Wings dark brown, basad of the arculus a very little more yellowish, but this not at all conspicuous; veins brown. Venation: *Sc*1 ending just

before mid-length of *R*2 + 3, *Sc*1 about equal to $r - m$; basal deflection of *Cu*1 at about one-fourth the length of cell 1*st M*2.

Abdomen dark brownish black.

Hab. Brazil (Ex the Winthem Collection).

The females have the centres of cells *R*, *M*, *Cu*, *Anal cells*, *R*3, *R*5 and the medial and cubital cells paler brown and the base of the wing not brightened. I can see no difference between such specimens and the description of *E. tenebrosa* (Walker), which is probably a synonym of *E. nigra*. The pale coloration at the base of the wing is much less conspicuous than would be expected from the description of *E. nigra*.

Eriocera myrtea, sp. n.

General coloration shiny liver-brown; dorsum of head fiery orange; femora yellow, the tips and a broad, post-median ring brown; wings yellow, cell *Sc* brighter yellow, the veins very broadly seamed with brown.

Male.—Length about 10·5 mm.; wing 10·3 mm.

Rostrum and palpi dark brown. Antennae short, light brown throughout. Dorsum of head fiery orange, the genae and ventral portions of head brown; vertical tubercle rather high, entire.

Pronotum and mesonotum shiny liver-brown, the lateral margins of the praescutum sparsely pollinose. Pleura brown with a sparse pruinosity. Halteres obscure yellow, the knobs dark brown. Legs with the coxae brown, sparsely pruinose; trochanters light brown; femora yellow, the tips rather narrowly dark brown; a less distinct brown ring immediately beyond mid-length of the segment, these two brown rings enclosing a conspicuous yellow, subterminal ring that is approximately as extensive as the brown tip; tibiae light brown, the tips dark brown; tarsi dark brown. Wings with the ground-colour greyish yellow, cell *Sc* brighter yellow; all the veins very broadly seamed with brown, restricting the ground-colour to the comparatively narrow centres of the cells; veins dark brown. Venation: *Sc*1 ending about opposite two-fifths the length of *R*2 + 3; *Sc*1 about equal to *m*, *Sc*2 very short; cell 1*st M*2 comparatively small; basal deflection of *Cu*1 a short distance beyond the fork of *M*.

Abdomen dark liver-brown, only the hypopygium conspicuously orange.

Hab. Brazil.

Holotype, ♂, Ex the Winthem Collection.

Type in the collection of the Vienna Museum.

Eriocera melina, sp. n.

General coloration yellow; head orange; mesonotal praescutum and scutum marked with light grey; femora brown with a subterminal yellow ring; wings of a saturated yellow, darker beyond the cord, the veins narrowly margined with light yellow; abdomen yellow with a conspicuous brownish black subterminal ring.

Male.—Length about 14·5 mm.; wing 12·5 mm.

Rostrum and palpi dark brown. Antennae with the scapal segments fiery orange; flagellum broken. Head entirely orange; vertical tubercle rather high, scarcely notched.

Pronotum brown. Mesonotal praescutum chestnut-brown with four light grey stripes; scutum light grey; scutellum and postnotum obscure yellow. Pleura brownish yellow, the dorsal pleurites a little darker. Halteres short, yellow, the knobs dark brown. Legs with the coxae and trochanters obscure brownish yellow; only the posterior femora and tibiae remain; femora dark brown, the basal quarter obscure yellow; a conspicuous subterminal yellow ring before the slightly broader brown tip; tibiae brown, the tips dark brown; tarsi broken. Wings with a saturated yellow suffusion that deepens into brownish in the cells beyond the cord and less distinctly in the anal cells; all the veins are narrowly bordered by a conspicuous, light yellow margin; veins obscure yellow. Venation: *Sc* comparatively short, *Sc*1 ending a short distance beyond the fork of *Rs*, *Sc*2 almost exactly opposite this fork; *r* less than its length beyond the fork of *R*2 + 3; cell 1*st M*2 rather small, pentagonal; basal deflection of *Cu*1 at or immediately beyond the fork of *M*.

Abdomen shiny honey-yellow with a conspicuous, brownish black subterminal ring, this latter including the extreme margin of tergite five, all of tergites six and seven, and more than the basal half of eight; of the sternites, only sternite six is distinctly included in this ring; extreme caudal margins of tergites three and four indistinctly darkened. Hypopygium obscure reddish.

Hab. Paraguay.
Holotype, ♂, San Bernardino (*Fiebrig*).
Type in the collection of the Vienna Museum.

Ozodicera (Dihexaclonus) panamensis, sp. n.

Male.—Length, 23·5 mm.; wing, 20 mm.; abdomen alone, 16·5 mm.

Generally similar to *O.* (*D.*) *fumipennis* Loew, of Brazil, differing as follows:

Size larger. Basal segments of the flagellum light brown, the pectinations dark brownish black. Mesonotal praescutum golden yellowish with four greyish brown stripes, the intermediate pair confluent in front, behind separated by a narrow brownish yellow line. Femora reddish brown, the tips scarcely, if at all darker; remainder of the legs reddish brown. Wings strongly yellowish grey, the base and the costal and subcostal cells more saturated; stigma yellowish brown; a scarcely apparent darker cloud at $r - m$; veins yellowish brown. Abdomen bright brownish yellow, only the apical segments passing into reddish brown, segments eight and nine being of this latter colour; a broad brown lateral line on the tergites, beginning narrowly at the base of segment two, scarcely interrupted at the incisures; the smooth basal rings of the tergites slightly brighter in colour. Male hypopygium with the ninth tergite having a deep and narrow U-shaped median notch, the sublateral lobes thus formed being slender and with the apices subacute. Ninth sterno-pleurite produced caudad into a conspicuous flattened blade that is almost as wide as long, the caudal ventral angle running out into a small tooth. Outer pleural appendage appearing as flattened yellowish lobes, the tips of which are truncated. Inner pleural appendage heavily chitinised, the caudal margin with two conspicuous chitinised thorns.

Hab. Panama.

Holotype, ♂, Rio Chico, near the mouth of the Rio Porcona, Dept. of Panama, August 4, 1918 (*Axel Olsson*).

Type in the collection of the writer.

This is the first record of the genus *Ozodicera* in North America.

III. *Descriptions of South American* Micro-Lepidoptera.

By Edward Meyrick, B.A., F.R.S.

[Read Dec. 7, 1921.]

A further contribution is here made to the study of the *Gelechiadae* of South America, representing a part of the collections made for me on the Amazons by Mr. H. S. Parish, who spent about a year there, journeying from Para as far up as Iquitos and the R. Napo in Peru. He succeeded in obtaining nearly all the species taken by Bates (principally at Ega, now known as Teffé) nearly 70 years ago, and subsequently described by Walker. Four genera and 107 species are now described as new.

Empedaula phanerozona, n. sp.

♂♀. 11–12 mm. Head whitish-grey-ochreous, sidetufts mixed dark fuscous. Palpi stout, dark fuscous, seven whitish rings, terminal joint strongly tufted posteriorly with light ochreous scales. Thorax ochreous-whitish, shoulders suffusedly irrorated dark fuscous. Forewings elongate-lanceolate; ochreous-whitish, somewhat sprinkled irregularly light grey; small dots of blackish irroration at base of costa and dorsum; a transverse brownish stria irrorated blackish at $\frac{1}{5}$ more or less expressed; a moderate slightly oblique brown fascia before middle, darker posteriorly; minute black dots in disc at middle and $\frac{3}{4}$; costa broadly suffused fuscous on posterior half, some rosy-whitish irroration crossing wing near apex: cilia rosy-whitish, on upper part of termen irregularly mixed dark fuscous irroration, a short blackish subbasal line beneath apex, on costa blackish forming a projecting apical hook and terminated anteriorly by a small whitish-spot, on tornus light greyish. Hindwings rather dark grey; cilia grey.

Brazil, Obidos, R. Trombetas, in September; two specimens. I also refer here *rhodocosma* Meyr., allied to the above, the palpi being similar but less accentuated; I received a fine example from R. Trombetas.

Dissoptila crocodora, n. sp.

♂♀. 9–10 mm. Head yellow-whitish. Palpi white, a greyish tinge beneath apex of second joint, a subapical dark fuscous ring on

terminal joint. Thorax blackish-grey, posterior margin and apical half of patagia deep ochreous-yellow. Forewings rather narrow, apex pointed, termen extremely obliquely rounded; purplish-grey; basal fourth deep ochreous-yellow, whence a streak extends along costa to near apex, marked with a blackish dash on costa in middle, and a longer one about $\frac{3}{4}$; discal tufts at $\frac{1}{3}$ blackish-grey: cilia grey. Hindwings and cilia grey.

Brazil, R. Trombetas, Teffé; Peru, Iquitos; September to March, six specimens.

Stomopteryx eucharacta, n. sp.

♂♀. 13–14 mm. Head, thorax dark leaden-fuscous. Palpi blackish lined white. Forewings slightly dilated, costa faintly sinuate, posteriorly arched, apex pointed, termen slightly sinuate, very oblique; bronzy-blackish; markings snow-white; a transverse streak from costa at $\frac{1}{5}$ not reaching dorsum; a dot on costa before middle, and one on fold nearly beneath this; an inwards-oblique streak from costa at $\frac{2}{3}$ reaching half across wing; a short oblique subdorsal mark beneath this; a fine terminal line enlarged at apex: cilia dark fuscous, basal half bronzy-blackish, a white bar at apex. Hindwings termen sinuate; bronzy-blackish; an irregular-edged white spot beneath middle of disc; a fine interrupted white line along upper part of termen; cilia rather dark grey, basal third blackish, a white bar at apex.

Brazil, Obidos, Teffé, in September, December, and January; four specimens.

Anterethista phosphoropa, n. sp.

♂♀. 7–9 mm. Head, thorax dark grey. Palpi white, second joint grey except apex, anterior edge of terminal joint dark grey. Forewings elongate, costa gently arched, apex obtuse-pointed, termen very obliquely rounded; glossy dark grey, on posterior half dark fuscous; an oblique iridescent violet-metallic strigula from costa at $\frac{2}{3}$; similar bright iridescent violet-metallic scattered scales in disc posteriorly, and a dot on dorsum before tornus: cilia grey with silvery-blue-metallic gloss, at apex a black basal spot, on costa a white patch divided into three wedgeshaped spots by radiating dark fuscous bars. Hindwings and cilia dark fuscous; in ♂ a slender expansible dark grey hairpencil from costa near base, and a large dense pencil of blackish hairscales from base lying along dorsum.

Peru, Jurimaguas, in March, ten specimens; Brazil, Para, in July, one ♀. Examples of the very similar *heteractis* from Parintins, Brazil, and Iquitos, Peru, show that the ♂ has also a costal hairpencil, but no dorsal pencil; the costal strigula is always white, not violet-metallic.

Calliprora Meyr.

Both the described species of this elegant genus, *pentagramma* and *trigramma*, were found commonly from Parintins and Teffé in Brazil to Iquitos and Jurimaguas in Peru. I am able to give 7 additional species; the peculiar wing-form is constant throughout the genus.

Calliprora rhodogramma, n. sp.

♂. 9–10 mm. Head dark purplish-fuscous, a pale yellowish stripe on side of crown. Palpi yellow-whitish, anterior edge throughout and a lateral line on second joint black. Thorax dark purple-fuscous, three slight lines and a stronger stripe on patagia pale yellowish. Forewings formed as in *pentagramma*; dark purple-fuscous; a pale yellowish median streak from base to $\frac{2}{3}$; a pale yellowish sinuate transverse streak before middle; an inwards-oblique pale yellowish subdorsal strigula preceding a dot on dorsum before tornus, just beyond this a somewhat oblique pale yellowish streak reaching half across wing and an oblique mark from costa at $\frac{3}{4}$, the gap between these preceded by a short pale yellowish longitudinal mark and a faint whitish dash beneath it; a purplish-leaden angulated transverse streak beyond these, lower portion thick and resting on termen, upper half margined posteriorly by an angulated brown streak sending a branch to apex of wing, and angle connected with tip of preceding yellow costal mark by a brown mark; two oblique white wedgeshaped marks posteriorly on costa partly in cilia: cilia dark fuscous, on termen coppery with basal half crimson. Hindwings and cilia dark grey.

Brazil, Manaos, Teffé, in November and January; two specimens.

Calliprora centrocrossa, n. sp.

♂. 6–7 mm. Head ochreous-whitish, anterior edge blackish. Thorax ochreous-whitish, four dark purple-grey stripes. Forewings as in *pentagramma*; greyish-purple; dorsal and three other ochreous-

whitish longitudinal streaks from base to $\frac{2}{5}$, uppermost supramedian; a moderate slightly oblique ochreous-whitish fascia from middle of dorsum reaching $\frac{4}{5}$ across wing; an ochreous-whitish dot towards dorsum beyond this; an ochreous-yellow oblique streak from costa at $\frac{2}{3}$ and less oblique ochreous-whitish streak from dorsum before tornus almost or quite meeting at an acute angle, angle preceded by an oblique whitish mark; an ochreous-yellow marginal line running round posterior part of costa and termen: cilia violet-grey, on costa with converging white bars near origin of cilia and before apex, on termen submetallic, with four black basal dots. Hindwings and cilia grey.

♀. 9 mm. Head dark fuscous, sides ochreous-whitish. Palpi white, anterior edge black. Thorax dark fuscous, five whitish stripes. Forewings dark greyish-purple; a whitish streak on dorsum from near base and three suffused whitish streaks above it from base to $\frac{1}{3}$, uppermost supramedian; a moderate slightly oblique whitish fasciate streak from dorsum before middle reaching $\frac{4}{5}$ across wing; a transverse whitish submedian mark at $\frac{2}{3}$; oblique whitish acute-pointed fasciate streaks from costa at $\frac{2}{3}$ and dorsum at $\frac{3}{4}$, nearly forming an angulated fascia but not meeting, in gap between these two longitudinal whitish marks; a suffused ochreous marginal line round posterior third of costa and termen: cilia dark grey, on costa towards apex two converging whitish marks, on termen four basal black dots separated by whitish spaces. Hindwings and cilia dark grey.

Brazil, Parintins, in October; eight specimens (7 ♂, 1 ♀).

Calliprora tetraplecta, n. sp.

♂. 10 mm. Head ochreous-whitish, two dark fuscous stripes on crown. Palpi ochreous-whitish, anterior edge black, a dark fuscous lateral line on second joint. Thorax dark fuscous, five grey-whitish lines. Forewings as in *pentagramma*; dark violet-fuscous; two closely approximated whitish median lines from base to $\frac{1}{3}$, a similar dorsal line, and a subdorsal line terminating in an oblique wedge-shaped mark reaching middle of disc; a transverse band composed of seven whitish nearly longitudinal lines at $\frac{3}{4}$, uppermost subcostal, oblique, third converging to second, fourth very short, sixth oblique, seventh dorsal; an angulated violet-silvery subterminal line, followed by an angulated ferruginous-brown terminal streak, with an arm extending along apical prominence: cilia dark glossy violet-blue-grey, on tornus grey, on costa dark fuscous with two

white bars and a dark apical hook. Hindwings dark fuscous, lighter anteriorly; cilia grey.

PERU, Iquitos, in March; one specimen.

Calliprora platyxipha, n. sp.

♂♀. 10–12 mm. Head ochreous-whitish, two dark fuscous stripes on crown. Palpi ochreous-whitish, anterior edge black. Thorax whitish, four dark fuscous stripes. Forewings as in *pentagramma*; dark fuscous; a broad ochreous-whitish pointed supramedian streak from base to near middle, in ♀ narrower and with a short whitish line above its posterior portion; a shorter whitish submedian line from base, and a much shorter dorsal line towards base; a rather oblique triangular whitish spot on middle of dorsum reaching half across wing, in ♀ narrower; in ♂ an oblique whitish wedgeshaped streak from costa about ⅔, beneath this a longitudinal line, then a wedgeshaped spot, then two longitudinal lines, and finally one on dorsum, these markings in ♀ smaller and less developed; an angulated purple-grey subterminal line, in ♀ whitish at extremities, in ♂ stronger and whitish on costal and dorsal thirds; a ferruginous-brownish streak from costa beyond this running to apex, sometimes extended by obscure suffusion along termen: cilia coppery-purple, on tornus grey, on costa dark fuscous with two white bars and a dark apical hook. Hindwings dark fuscous; cilia grey.

BRAZIL, Para, Parintins, June to October; PERU, Jurimaguas, March; six specimens.

Calliprora eurydelta, n. sp.

♂. 12 mm. Head ochreous-whitish, two dark fuscous stripes on crown. Palpi ochreous-whitish, anterior edge blackish. Thorax whitish, a patch of dark grey suffusion occupying anterior half of dorsum, and small spots on shoulders. Abdomen grey, genital valves and uncus unusually large. Forewings as in *pentagramma*; dark violet-grey; base narrowly ochreous-whitish, extended as a dorsal streak to a rather oblique broad-triangular blotch on dorsum before middle reaching more than half across wing; a band of seven whitish irregularly longitudinal lines or slender streaks at ¾, first subcostal, oblique, fifth and sixth longest, parallel to fold, seventh dorsal; a purple-leaden angulated subterminal line, extremities whitish, some bronzy-ferruginous suffusion before its angle, wing beyond it wholly bronzy-ferruginous: cilia coppery-purplish, on

tornus grey, on costa dark fuscous with two white bars. Hindwings grey, becoming dark fuscous posteriorly; cilia grey.

Peru, Jurimaguas, in March; one specimen.

Calliprora erethistis, n. sp.

♂. 9–10 mm. Head ochreous-whitish, two broad dark fuscous stripes on crown. Palpi whitish-ochreous, anterior edge black. Thorax grey, four dark grey stripes, interspaces sometimes tinged ochreous-whitish anteriorly. Forewings as in *pentagramma*; dark violet-grey; a transverse whitish irregularly wedgeshaped spot from middle of dorsum reaching $\frac{3}{4}$ across wing; a fascia of about seven irregularly longitudinal short fine whitish dashes at $\frac{3}{4}$, uppermost subcostal, lowest forming a small dorsal spot; a purple-silvery angulated subterminal line; a bronzy-ferruginous streak from costa beyond this to apex: cilia deep purple, on tornus grey, on costa dark fuscous with two white bars. Hindwings dark grey; cilia grey.

Peru, Jurimaguas, in March; four specimens.

Calliprora peritura, n. sp.

♀. 9 mm. Head ochreous-whitish, two broad dark fuscous stripes on crown. Palpi ochreous-whitish, anterior edge black. Thorax rather dark grey, four indistinct darker stripes. Forewings as in *pentagramma*; rather dark grey; an indistinct dark fuscous streak rising obliquely from middle of dorsum, curved in disc to angle of subterminal line; an angulated violet-grey subterminal line, whitish towards extremities, edged dark fuscous suffusion anteriorly, wing beyond this ferruginous-brown: cilia coppery-purplish, a dark grey basal line, on tornus grey, on costa grey mixed dark fuscous, with two white bars. Hindwings dark grey; cilia grey.

Brazil, Para, in July; one specimen.

Hapalonoma argyracta Meyr.

The specific name is superseded by *sublustricella* Walk.; I did not know the variability of the species, which has commonly a very oblique thick black streak from dorsum at $\frac{1}{4}$, not developed in my original specimens, occasionally even the whole wing suffused ferruginous-ochreous mixed with fuscous suffusion; I am, however, satisfied that these different-looking forms belong to the same species, which I have also from Obidos and Teffé in Brazil, Iquitos and Jurimaguas in Peru.

Ethirostoma interpolata, n. sp.

♂♀. 9 mm. Head, thorax ochreous-whitish. Palpi whitish, second joint with whorls of blackish-grey white-tipped scales roughly and angularly projecting beneath, terminal joint with blackish supramedian ring. Forewings elongate, costa faintly sinuate, somewhat bent at $\frac{4}{5}$, apex obtuse, termen obliquely rounded; brownish-fuscous, tips of scales minutely whitish, forming a very fine transverse striation; dark fuscous dots towards costa near base and at $\frac{1}{5}$ and $\frac{1}{3}$, and two above and below fold at $\frac{1}{4}$; stigmata dark fuscous, plical rather obliquely before first discal; a gradually expanded streak of dark fuscous suffusion along costa from $\frac{1}{3}$ to subterminal line, cut by an oblique white strigula from middle of costa; a nearly straight whitish line from $\frac{4}{5}$ of costa to tornus, hardly angulated in middle, beyond angle a short black dash, sometimes a second more minute indicated beneath it: cilia fuscous speckled whitish, base whitish within a dark brown line. Hindwings dark grey; cilia grey.

Brazil, Teffé, in December; Peru, Jurimaguas, in March; five specimens.

Commatica extremella Walk.

Differs from *chionura* Meyr. only in possessing two white dots in cilia of forewings between subterminal line and praeapical dot, sometimes terminated with greyish-ochreous beneath. This difference appears to be constant and localised, *extremella* being characteristic of Teffé (the original locality), whence I have fourteen specimens, whilst I have a long series of *chionura* from other Amazon localities from Para to Iquitos.

Commatica stygia, n. sp.

♂. 9 mm. Head, palpi, thorax dark fuscous, terminal joint of palpi whitish posteriorly. Forewings elongate, costa gently arched, apex obtuse, termen very obliquely rounded; dark fuscous; a faint interrupted fine whitish line from $\frac{3}{4}$ of costa to tornus, acutely angulated in middle and very near margins throughout: cilia grey, two dark fuscous lines. Hindwings dark grey; a grey expansible hairpencil lying in disc from base to middle; cilia grey.

Brazil, Parintins, in October; one specimen. Next *eremna.*

Commatica palirrhoa, n. sp.

♂♀. 9–10 mm. Head, thorax pale greyish-ochreous. Palpi whitish, second joint dark grey except apex, anterior edge of terminal joint dark grey. Forewings elongate, costa gently arched, apex obtuse, termen obliquely rounded; light greyish-ochreous, on posterior half irrorated dark grey; a blackish costal streak from before middle to apex, broad towards $\frac{4}{5}$ but finely attenuated anteriorly and shortly pointed posteriorly, cut by a very oblique fine white striga from $\frac{3}{4}$; plical stigma sometimes blackish; a streak of whitish suffusion along termen from tornus, not reaching apex but expanded into an irregular projection before it; two or three indistinct dark terminal dots: cilia whitish, on costa fuscous-tinged with dark fuscous basal line and two others forming apical hooks. Hindwings grey; cilia light grey.

Brazil, Teffé, in January; Peru, Jurimaguas and R. Napo, March to May; fourteen specimens.

Commatica servula, n. sp.

♂. 9–10 mm. Head, thorax light grey. Palpi whitish, second joint grey except apex. Forewings elongate, slightly dilated, costa gently arched, apex obtuse, termen obliquely rounded; violet-grey, becoming darker posteriorly; a blackish costal streak from before middle to apex, broad towards $\frac{4}{5}$ but finely attenuated anteriorly and shortly pointed posteriorly, cut by a very oblique fine white striga from $\frac{3}{4}$; a thick whitish streak along termen from tornus, not reaching apex but expanded into an irregular projection before it, including two more or less developed spots of ground-colour: cilia whitish, on costa with dark fuscous basal line and two others forming apical hooks. Hindwings grey; a large expansible light grey hairpencil from base lying in disc; cilia pale greyish.

Peru, Jurimaguas, in March; three specimens.

Commatica phanocrossa, n. sp.

♂. 10 mm. Head, thorax ochreous-whitish. Palpi dark fuscous, terminal joint whitish except base. Forewings elongate, costa gently arched, somewhat bent at $\frac{3}{4}$, apex obtuse, termen very obliquely rounded; whitish-ochreous, anterior half of costa suffused white; plical and second discal stigmata represented by elongate dark brown marks, approximated; a dark brown suboblique dash in disc beyond these; a dark brown streak along costa from middle to apex, attenuated to extremities, cut by a very oblique fine white striga

from $\frac{2}{3}$, and marked with a black spot at apex; a narrow white terminal streak preceded by a few brownish scales and including three blackish dots: cilia silvery-metallic, base white, on costa a dark fuscous basal line and dark brown median line forming apical hook, tips grey. Hindwings dark grey; cilia light grey, round apex whitish except towards base.

Brazil, Teffé, in January; one specimen.

Commatica xanthocarpa, n. sp.

♂♀. 8–9 mm. Head violet-grey, face whitish, sides of collar orange. Palpi white, second joint with violet-grey subapical band, base and anterior edge of terminal joint dark grey. Thorax dark violet-grey. Forewings rather narrow, costa gently arched, apex obtuse, termen very obliquely rounded; dark purple-fuscous irregularly suffused orange-fulvous, leaving especially an undefined dark fasciate streak proceeding from dorsum before middle obliquely across fold, thence longitudinally to join a similar dark fascia from costa preceding a fine whitish oblique striga from costa at $\frac{3}{4}$ reaching $\frac{3}{4}$ across wing, apical area beyond this orange with two white dots on costa before apex: cilia grey, a black basal line round apex, base elsewhere orange. Hindwings dark fuscous; cilia grey.

Peru, Jurimaguas, in March; six specimens. Next *acropelta*.

Commatica hexacentra, n. sp.

♀. 9 mm. Head, thorax dark bronzy-grey, face lighter. Palpi whitish, second joint dark grey except apex, anterior edge of terminal joint dark grey. Forewings elongate, costa gently arched, apex obtuse, termen obliquely rounded; dark grey, becoming dark bronzy-fuscous towards costa posteriorly; a very fine whitish line from a white mark on costa at $\frac{2}{3}$ to dorsum before tornus, acutely angled in middle, both halves straight and very oblique; three white dots on termen: cilia dark grey, a blackish basal line, on costa three white dots. Hindwings dark grey; cilia grey.

Brazil, Teffé, in January; one specimen.

Battaristis syngraphopa, n. sp.

♂♀. 9–10 mm. Head, thorax pale grey. Palpi white, second joint grey except apex, anterior edge of terminal joint blackish. Forewings elongate, costa gently arched, more strongly posteriorly, apex obtuse-pointed, termen rounded, rather strongly oblique;

light grey, posteriorly suffused darker grey or sometimes brownish-tinged; a transverse dark fuscous spot crossing fold at $\frac{1}{4}$; a cloudy dark fuscous dot towards costa at $\frac{1}{3}$; stigmata cloudy, dark fuscous, discal approximated, plical rather obliquely before first discal; a very oblique white strigula from middle of costa, preceded by an elongate dark fuscous mark, a similar mark preceding subterminal line; a fine white line from $\frac{3}{4}$ of costa to tornus, obtusely angulated in middle, upper half straight, lower slightly sinuate; a small blackish suboval apical spot and subapical dash, separated by a white dash, above and beneath these marginal spots of white suffusion: cilia grey suffusedly mixed whitish, a dark fuscous subbasal line. Hindwings dark grey; cilia grey.

Brazil, Manaos, in November; Peru, Iquitos, in May; three specimens.

Battaristis coniosema, n. sp.

♂. 9–10 mm. Head, thorax grey, shoulders narrowly white. Palpi dark grey. Forewings elongate, costa gently arched, apex pointed, termen sinuate, oblique; 6 to apex; grey; costal area broadly suffused white on anterior half; a thick black upcurved streak from towards dorsum at $\frac{1}{3}$ to disc at $\frac{3}{5}$, posterior half edged above by a suffused white streak extended nearly to angle of subterminal line, and marked above by a black dot representing second discal stigma; a bronzy-blackish streak along costa from $\frac{2}{5}$ to apex, anteriorly acute, cut by very oblique fine white lines at middle and $\frac{2}{3}$, latter (subterminal line) continued to termen where it forms a very acute angular projection including a black strigula, and thence towards dorsum before tornus but not reaching it; area between costal and discal streaks suffused whitish and tinged brown; a dark grey white-speckled suboblique streak from costa at $\frac{5}{6}$ to projection of subterminal line: cilia grey, above apex two blackish hooks. Hindwings dark fuscous; cilia grey.

Brazil, Para, July; Peru, Jurimaguas, Iquitos, in March; four specimens.

Battaristis synocha, n. sp.

♂♀. 8–9 mm. Head, thorax light greyish-ochreous. Palpi whitish, second joint dark ochreous-grey with blackish ring beneath white apex, base of terminal joint dark fuscous. Forewings elongate, costa gently arched, apex obtuse-pointed, termen obliquely rounded; light greyish-ochreous, paler towards costa anteriorly;

costal edge anteriorly blackish; an irregular thick upcurved blackish-fuscous streak from towards dorsum before middle to disc at $\frac{2}{3}$; a very oblique blackish strigula from costa at $\frac{1}{3}$; a thick bronze-brown streak irregularly suffused black towards costa from near beyond this to apex, anteriorly acute, cut by a very oblique fine white line from middle of costa, and one less oblique from $\frac{3}{4}$ making a very acute angular projection in middle and continued to dorsum before tornus, both halves sinuate inwards, projection enclosing a very fine black dash: cilia grey mixed greyish-ochreous on termen, base dark brown round costa and apex. Hindwings dark fuscous; cilia grey, darker towards base.

PERU, Iquitos, March to May; eight specimens.

Battaristis sphenodelta, n. sp.

♂. 9 mm. Head, thorax whitish-grey-ochreous. Palpi white, second joint suffused light grey except apex, darker above, terminal joint dark grey towards apex. Forewings elongate, costa gently arched, apex obtuse, termen very obliquely rounded; whitish-ochreous, costa suffused white anteriorly; an elongate-triangular blackish blotch on middle of costa; a wedgeshaped black costal blotch from just beyond this to near apex, cut by a fine white subterminal line from $\frac{3}{4}$ of costa to tornus, right-angled in middle and marked with a black dash on angle; apical area beyond this brownish-tinged, some whitish suffusion towards apex and along termen: cilia grey-whitish, on costa greyer with blackish basal line and two dark fuscous lines towards tips opposite apex. Hindwings and cilia grey.

BRAZIL, Teffé, in January; one specimen.

Alsodryas prasinoptila, n. sp.

♂. 15 mm. Head, thorax light green, whitish-sprinkled, face whitish. Palpi white, second joint dark greenish-grey except towards base, with rough projecting scales towards apex beneath, anterior edge of terminal joint blackish except towards base. Forewings elongate, slightly dilated, costa faintly sinuate, somewhat bent at $\frac{3}{4}$, apex obtuse, termen rather obliquely rounded; green, tips of scales whitish; large subcostal and subdorsal tufts at $\frac{1}{4}$; smaller tufts mixed dark grey representing stigmata, plical hardly before first discal; a paler shade from $\frac{3}{4}$ of costa to dorsum before tornus, very obtusely angulated in middle, upper half slightly sinuate, some dark grey irroration beyond angle; cloudy blackish-

grey marginal dots round posterior part of costa and termen: cilia grey. Hindwings dark fuscous; cilia grey.

Brazil, R. Trombetas, in September; one specimen.

Alsodryas deltochlora, n. sp.

♂. 16 mm. Head, thorax light green, face whitish. Palpi second joint green, with rough projecting scales towards apex beneath, terminal joint yellow, paler basally. Forewings elongate, slightly dilated, costa somewhat bent at $\frac{3}{4}$, apex obtuse, termen rounded, somewhat oblique; dull green; a small black spot on base of costa; small tufts above and below middle at $\frac{1}{5}$, and one on costa rather beyond these; a triangular black blotch on middle of costa, not reaching half across wing; small tufts representing stigmata, plical somewhat before first discal, which adjoins apex of costal blotch, small linear black dots beneath plical and second discal; an irregular line of faint whitish irroration from $\frac{3}{4}$ of costa to dorsum before tornus, rather angulated in middle and somewhat incurved on both halves, preceded on costa and dorsum by small spots of blackish suffusion; an interrupted black line along termen: cilia dark grey, on costa pale greenish-grey. Hindwings dark fuscous; cilia dark grey.

Brazil, Obidos, in August; one specimen.

Sorotacta bryochlora, n. sp.

♀. 15 mm. Head ochreous-whitish, crown slightly mixed olive-greenish. Palpi whitish, apical band of second joint and broad median band of terminal irrorated dark greenish-grey. Thorax ochreous-whitish mixed olive-green. Forewings elongate, costa gently arched, apex obtuse, termen very obliquely rounded; rather dark olive-green, tips of scales ochreous-whitish; a small ochreous-whitish tuft on middle of costa preceded by a spot of darker suffusion; stigmata darker, plical beneath first discal; an indistinct shade of ochreous-whitish irroration from costa at $\frac{3}{4}$ to tornus, indented beneath costa; indistinct darker marginal dots round posterior part of costa and termen: cilia grey, pale-speckled. Hindwings dark grey; cilia grey.

Brazil, Parintins, in October; one specimen.

Anacampsis diplodelta, n. sp.

♀. 12 mm. Head, thorax grey, face and shoulders tinged ochreous whitish, a black dot on posterior extremity of thorax. Palpi dark

grey, apical edge of second joint whitish, terminal joint whitish-speckled. Forewings elongate, slightly dilated, costa posteriorly gently arched, apex rounded-obtuse, termen rounded, rather oblique; violet-grey, more purple-tinged posteriorly; costa broadly whitish from base to first blotch, blackish costal marks at base and $\frac{1}{5}$, and a subcostal dot beyond second; two triangular black costal blotches almost touching and extending on costa from $\frac{1}{4}$ to $\frac{3}{4}$, some white irroration between and beyond these; stigmata obscurely darker, discal approximated, plical rather before first discal, some white irroration round these; a transverse mark of whitish irroration beyond second blotch indicating subterminal line, rest hardly traceable; an indistinct dark fuscous marginal streak round apex and termen: cilia dark grey. Hindwings dark fuscous; cilia grey, a darker subbasal shade.

Brazil, Parintins, in October; one specimen.

Anacampsis lithodelta, n. sp.

♂♀. 10 mm. Head, thorax whitish-grey-ochreous. Palpi dark fuscous, apical edge of second joint whitish, terminal joint posteriorly ochreous-whitish. Abdomen grey, in ♂ whitish-ochreous dorsal patches towards base and apex. Forewings elongate, slightly dilated, costa somewhat bent at $\frac{1}{5}$, apex obtuse, termen obliquely rounded; whitish-grey-ochreous; a large blackish triangular blotch extending over median third of costa and reaching more than half across wing; undefined slight transverse marks of dark grey irroration beyond apex of this and above middle of dorsum; a fine angulated line of dark grey irroration from a blackish dot on costa at $\frac{3}{4}$ to tornus; terminal area beyond this brownish-tinged; a blackish marginal line round apex and termen: cilia dark grey, beneath tornus ochreous-whitish. Hindwings dark grey; cilia grey.

Peru, Jurimaguas, Iquitos, in March; two specimens.

Anacampsis poliombra, n. sp.

♂. 10 mm. Head, thorax pale grey suffusedly irrorated white. Palpi dark fuscous, terminal joint whitish except basal fourth and supramedian ring. Forewings elongate, costa gently arched, apex pointed, termen obliquely rounded; grey, suffusedly irrorated white, some scattered dark fuscous scales; an oblique mark of dark fuscous suffusion beneath costa at $\frac{1}{5}$; an oblique suffused dark fuscous streak from dorsum at $\frac{1}{5}$ reaching more than half across wing, containing a subdorsal tuft; stigmata blackish, plical beneath first discal; a cloudy elongate dark fuscous spot on middle of costa;

an irregular whitish line from ¾ of costa to tornus, slightly angulated in middle and somewhat incurved on upper half, preceded by a fascia of dark fuscous suffusion broader on lower half; an elongate spot of dark fuscous suffusion following this above angle; dark fuscous marginal dots round apex: cilia grey, suffusedly irrorated white, base spotted dark fuscous. Hindwings grey, darker posteriorly; cilia light grey.

Brazil, Parintins, in October; two specimens.

Anacampsis perquisita, n. sp.

♂♀. 8 mm. Head, thorax grey sprinkled whitish. Palpi second joint dark fuscous, apex whitish, terminal whitish with subbasal and subapical dark fuscous rings. Forewings rather narrow, costa slightly arched, apex obtuse, termen obliquely rounded; dark grey irregularly irrorated whitish; blackish spots on costa at base and ⅕, on dorsum at base, and crossing fold at ¼; an elongate blackish spot on middle of costa; stigmata forming roundish dark fuscous spots, plical beneath first discal; a sinuate whitish line from ¾ of costa to dorsum before tornus, preceded on costa by an elongate blackish spot; one or two dark fuscous dots on costa beyond this, and one on termen beneath apex: cilia dark grey, whitish-speckled. Hindwings dark grey; cilia grey.

Brazil, Para, Teffé, in June, July, and January; three specimens.

Anacampsis considerata, n. sp.

♂♀. 12–15 mm. Head, thorax grey irrorated ochreous-whitish. Palpi whitish sprinkled grey, second joint with broad dark fuscous basal and apical bands sometimes confluent, terminal joint with submedian ring and subapical band. Forewings elongate, costa gently arched, apex obtuse, termen rounded, somewhat oblique; grey or fuscous, irregularly irrorated whitish or ochreous-whitish; two or three variable small dark fuscous spots at base; a transverse sometimes interrupted dark fuscous blotch from costa at ⅕; an indistinct rather oblique dark streak from dorsum at ⅓ more or less developed; a flattened-triangular dark fuscous median blotch on costa, and another before subterminal line; stigmata moderate, raised, dark fuscous, plical rather before first discal, an additional dot beneath second discal, sometimes confluent with it; an indistinct pale line from ¾ of costa to dorsum before tornus, hardly angulated in middle, sinuate inwards on upper half; two cloudy dark fuscous dots on costa beyond this, and one or two on termen beneath apex:

cilia grey, pale-speckled, obscurely barred darker. Hindwings dark fuscous; cilia grey.

Brazil, Parintins, Manaos, Teffé; Peru, Jurimaguas, Iquitos; from October to May; fifteen specimens.

Anacampsis petrographa, n. sp.

♂♀. 15–16 mm. Head, thorax light greyish-ochreous, face whitish-tinged. Palpi whitish, second joint dark fuscous except apical edge. Forewings elongate, slightly dilated, costa faintly sinuate, somewhat bent at $\frac{3}{4}$, apex obtuse, termen obliquely rounded; light greyish-ochreous or ochreous-grey, sometimes with faint olive-greenish tinge, some scattered dark fuscous or blackish scales; a black dot on base of costa and one near base in middle; small blackish spots on costa and dorsum at $\frac{1}{5}$, and three cloudy blackish dots in disc forming with these an excurved series; a flattened-triangular blackish blotch on costa before middle reaching $\frac{1}{4}$ across wing; stigmata blackish, discal approximated, plical rather obliquely before first discal; a very indistinct irregular line of whitish irroration from $\frac{3}{4}$ of costa to dorsum before tornus, slightly indented beneath costa, then slightly excurved, preceded on costa and dorsum by small spots of blackish suffusion; a marginal series of blackish dots round posterior part of costa and termen: cilia light violet-grey, basal third greyish-ochreous. Hindwings dark fuscous; cilia grey.

Brazil, Obidos, in August and September; nine specimens.

Anacampsis caneodes, n. sp.

♂. 9 mm. Head, thorax light ochreous-grey. Palpi whitish, second joint dark fuscous except apex. Forewings elongate, costa gently arched, apex obtuse, termen obliquely rounded; light fuscous, tips of scales obscurely whitish, forming a very fine transverse striation; a dark fuscous spot on costa at $\frac{1}{5}$, one beneath fold at $\frac{1}{5}$, and one above fold beyond it; an elongate dark fuscous median spot on costa, and one before subterminal line; a suffused dark fuscous spot towards costa at $\frac{2}{5}$; stigmata dark fuscous, plical rather before first discal; an indistinct whitish sinuate line from $\frac{3}{4}$ of costa to tornus; a dark fuscous dot beneath apex: cilia greyish. Hindwings dark grey; cilia grey.

Brazil, Para, in June; one specimen.

Anacampsis capyrodes, n. sp.

♂♀. 14–16 mm. Head, thorax pale greyish-ochreous or brownish-ochreous. Palpi ochreous-whitish, basal $\frac{2}{3}$ of second joint dark ochreous-grey, terminal joint with grey internal line. Abdomen dark grey. Forewings elongate, somewhat dilated, costa faintly sinuate, somewhat arched posteriorly, apex obtuse-pointed, termen rather obliquely rounded; pale ochreous or brownish-ochreous, variably tinged grey; stigmata very small, indistinct, dark fuscous, discal approximated, plical rather obliquely before first discal; an indistinct pale shade from $\frac{3}{4}$ of costa to dorsum before tornus, obtusely angulated in middle, upper portion slightly sinuate; very small dark fuscous marginal dots round apex and termen: cilia light ochreous. Hindwings dark grey or dark fuscous; cilia grey, darker towards base.

Brazil, Obidos, Parintins, Teffé, from September to January; fourteen specimens.

Anacampsis idiocentra, n. sp.

♂♀. 10–12 mm. Head, thorax greyish-ochreous. Palpi whitish, second joint dark fuscous except towards apex, terminal joint with grey line on each side of anterior edge. Forewings elongate, slightly dilated, costa faintly sinuate, somewhat arched posteriorly, apex obtuse-pointed, termen almost straight, oblique; greyish-ochreous; plical and second discal stigmata small, indistinct, fuscous; a faint pale shade from $\frac{1}{5}$ of costa to tornus, nearly straight, slightly indented above middle, sometimes hardly perceptible; two cloudy blackish dots on termen beneath apex, sometimes a third smaller beneath these: cilia greyish-ochreous. Hindwings dark fuscous; cilia grey, darker towards base.

Brazil, Santarem, in August; ten specimens. Near *capyrodes*, but certainly distinct.

Anacampsis flexiloqua, n. sp.

♂♀. 11 mm. Head, thorax fuscous. Palpi whitish-grey, second joint grey except towards apex. Forewings elongate, costa slightly sinuate, somewhat bent at $\frac{3}{4}$, apex obtuse-pointed, termen faintly sinuate, rather oblique; fuscous sprinkled brownish; plical and second discal stigmata obscurely darker; a faint paler shade from $\frac{3}{4}$ of costa to tornus, obtusely angulated in middle, halves straight; two or three indistinct dark dots on upper part of termen: cilia

pale brownish. Hindwings dark fuscous; cilia grey, a darker subbasal shade.

Peru, Iquitos, in May; six specimens. Distinguished from *capyrodes* and *idiocentra* by the palpi.

Compsolechia Meyr.

I have succeeded in obtaining all Walker's species attributable to this genus except *suspectella*, many of them in long series; they are confusing owing to their general similarity and variability, and require close observation. Following is a list of them, briefly showing the synonymy : *suffectella*, *stelliferella* (= *speciosella*), *perlatella* (= *smaragdulella* = *secundella*), *accinctella*, *versatella*, *scitella*, *solidella*, *transjectella*, *subapicalis*, *trajectella* (preoccupied and substituted by *diazeucta* Meyr.), *superfusella*, *abruptella* (=*sectella*), *repandella* (= *subscriptella* = *diortha* Meyr.), *seductella*, *tardella* (= *sublatella* = *collocatella*), *cognatella*, *monochromella* (= *displicitella*), *susceptella*, *canofusella*, *suffusella* (preoccupied and substituted by *amazonica* Meyr.), *secretella* (= *cistulata* Meyr. = *trimolybda* Meyr.), *quadrifascia* (= *superella*), *binotatella*, *suspectella*.

Compsolechia stelliferella Walk.

Contrary to the statement of Lord Walsingham (Biol. Centr. Amer., iv, 42) *speciosella* cannot be maintained as distinct from this; the apical white blotch in cilia varies in development (as does also the white colouring on apex of antennae, terminal cilia of hindwings towards tornus, and posterior tarsi); I have an example in which it is reduced to a slight dash, one in which it appears (very small) on undersurface only, and one in which it is represented by a slight whitish gloss. The different forms occur together in British Guiana, Brazil, and Peru, and the two supposed species were originally described from the same locality, Ega (Teffé). The ♀ has on undersurface of hindwings a white fascia from costa beyond middle reaching half across wing, which is absent in ♂, and in the latter sex the anal scales are sometimes mixed with yellowish.

Compsolechia pentastra, n. sp.

♂♀. 12–14 mm. Head dark metallic blue, face paler and whitish-tinged. Palpi light yellowish, terminal joint suffused dark fuscous

anteriorly. Antennae dark fuscous, in ♂ apical fourth white. Thorax dark fuscous, patagia dark metallic-blue. Forewings narrow at base, posteriorly rather dilated, costa faintly sinuate, apex obtuse, termen obliquely rounded; bronzy-blackish; a small dark metallic-blue spot at base; a white dot on fold at ¼ of wing, one beneath costa before middle, one in disc beyond middle and short opposite transverse marks from costa and dorsum near beyond this: cilia dark fuscous, a white patch occupying apex and upper part of termen. Hindwings dark bronzy-fuscous; cilia dark fuscous, a white apical spot. Both sexes beneath with transverse white mark in disc of forewings, and rather oblique white fascia from costa of hindwings beyond middle not reaching termen.

Brazil, Para, R. Trombetas, Parintins; Peru, Iquitos; from May to October, five specimens. Shorter-winged than *stelliferella*, the two posterior white marks of forewings transverse and much nearer the discal dot (though variable in position in *stelliferella*), and white fascia of hindwings beneath present in both sexes.

Compsolechia chelidonia, n. sp.

♂. 17 mm. Head glossy deep indigo-blue, face whitish-blue-grey, supraorbital scales pale yellow-ochreous. Palpi whitish-blue-grey, terminal joint pale yellowish, anteriorly dark grey. Thorax dark grey, posterior extremity indigo-blackish. Forewings rather narrow, costa faintly sinuate, apex obtuse, termen rather obliquely rounded; dark purple-fuscous, irregularly irrorated whitish; a triangular blackish blotch extending on costa from ⅓ to ⅔, apex reaching fold; a thick blackish streak from disc beyond middle to apex, above suffused and with two slender interneural streaks, beneath on posterior half edged with ochreous-whitish suffusion extending to termen and produced slenderly along lower part of termen, area between anterior half and dorsum free from whitish irroration: cilia dark slaty-grey. Hindwings dark fuscous; a long dark grey erectile hairpencil lying in submedian fold; cilia pale grey, a darker subbasal shade.

Brazil, Obidos, in August; one specimen. Nearest *cassidata*.

Compsolechia hemileucas, n. sp.

♂♀. 14–15 mm. Head glossy deep indigo-blue, face whitish, supraorbital scales ochreous-yellow. Palpi grey-whitish, terminal joint anteriorly dark grey. Antennae dark grey. Thorax dark

grey, posterior extremity blue-tinged. Forewings narrow, costa slightly sinuate, apex obtuse, termen obliquely rounded; dark violet-grey; markings suffused, blackish; a narrow basal fascia; a somewhat curved fascia at $\frac{1}{5}$; a rather curved fascia from $\frac{3}{5}$ of costa to middle of dorsum, indistinct towards margins; a broad streak from disc at $\frac{3}{5}$ to termen beneath apex: cilia bluish-grey. Hindwings dark fuscous, in ♂ basal half white, edge suffused, irregular; cilia whitish-blue-grey, a darker basal line.

Brazil, Parintins, in October; three specimens. Very near *cassidata* (of which both sexes were obtained at Para), but in that species the antennae are pale yellow-ochreous above on basal half, grey-whitish beyond, the posterior discal streak runs to apex, and the hindwings are not white in ♂.

Compsolechia quadrifascia Walk.

Very similar to *ferreata* Meyr., but constantly distinguished by the presence of a patch of white suffusion on lower surface of hindwings beyond middle of costa.

Compsolechia mesodelta, n. sp.

♂♀. 10–11 mm. Head, thorax grey, eyes crimson. Palpi whitish, second joint obscurely speckled grey, terminal joint anteriorly grey. Forewings narrow at base, posteriorly dilated, costa faintly sinuate, somewhat bent at $\frac{4}{5}$, apex obtuse, termen rounded, rather oblique; grey with faint greenish tinge, sometimes whitish-sprinkled; a triangular blackish blotch on middle of costa reaching half across wing; a faint pale somewhat irregular line from $\frac{1}{5}$ of costa to tornus, costal and terminal area beyond this suffused blackish, in the whitish-sprinkled example a terminal line of whitish irroration: cilia dark grey. Hindwings dark fuscous; cilia dark grey.

Brazil, Teffé, in December and January; two specimens.

Compsolechia argyracma, n. sp.

♂. 11 mm. Head, thorax shining dark blue-fuscous. Palpi ferruginous-ochreous. Abdomen dark fuscous, a silvery spot on segment 1 and basal bar on 2, ventral surface ochreous-whitish. Forewings rather narrow, somewhat dilated, apex slightly produced, obtuse-pointed, somewhat bent down, termen very obliquely rounded; dark bronzy-fuscous; base and more than dorsal half suffused violet-blue, an irregular oblique blue streak from costa at $\frac{1}{4}$ running

into it, edge of blue portion irregularly prominent beyond middle; a fine angulated blue subterminal line, tinged silvery-whitish on dorsal area; a shining silvery-whitish apical spot preceded by blue suffusion: cilia light blue-grey, tips whitish, on costa dark grey overlaid silvery-whitish towards base. Hindwings dark grey; cilia grey, tips grey-whitish. Hindwings beneath with white quadrate blotch from costa beyond middle.

Brazil, Para, in July; one specimen.

Compsolechia platiastis, n. sp.

♂. 14 mm. Head, thorax dark grey. Palpi grey, terminal joint whitish posteriorly. Forewings elongate, somewhat dilated posteriorly, apex obtuse, termen obliquely rounded; dark ashy-grey; plical and first discal stigma indistinct, cloudy, dark fuscous, plical rather anterior; a slender irregular grey line from $\frac{4}{5}$ of costa to dorsum before tornus margined anteriorly by a broad dark fuscous fascia extending from dorsum $\frac{3}{4}$ across wing, and posteriorly by a narrow entire fascia; two or three cloudy dark fuscous dots on upper part of termen: cilia grey, tips paler. Hindwings dark fuscous; cilia light grey, a dark grey subbasal shade.

Brazil, R. Trombetas, in September; one specimen.

Compsolechia petromorpha, n. sp.

♂. 12 mm., ♀. 14 mm. Head, thorax purplish-grey, face suffused ochreous-whitish. Palpi whitish-grey, terminal joint whitish, anteriorly grey. Forewings rather narrow, somewhat dilated, costa straight, arched posteriorly, apex obtuse, termen rounded, rather oblique; uniform rather dark violet-grey: cilia grey. Hindwings dark grey; in ♂ a long light violet-grey hairpencil lying in median fold and reaching end of cell, and a shorter but denser light grey hairpencil in submedian fold; cilia whitish-grey, a grey basal shade.

Peru, Jurimaguas, in March, 1 ♂; Brazil, Teffé, in January, 1 ♀. Distinct in both sexes from *lithomorpha* by forewings more dilated posteriorly with less oblique termen, the ♂ also by the two hairpencils; *lithomorpha* also occurs from Para to Jurimaguas.

Compsolechia sciomima, n. sp.

♂♀. 12–13 mm. Head, thorax glossy dark bluish-grey. Palpi grey. Forewings rather narrow, rather dilated posteriorly, apex

obtuse-pointed, termen obliquely rounded; glossy dark violet-slaty-grey; an obscure subterminal fascia of dark fuscous suffusion, broader in ♀ and extending suffusedly to termen: cilia violet-grey. Hindwings dark fuscous; cilia grey.

Brazil, Parintins, in October; Peru, Jurimaguas, Iquitos, in March; five specimens. Very close to *lithomorpha*, but I have seen very large numbers of that species, of which the forewings are always narrower, without distinct dilation, and always without any markings; certainly distinct.

Compsolechia phaeotoxa, n. sp.

♂♀. 13 mm. Head, thorax leaden-grey. Palpi pale glossy grey. Forewings rather narrow, posteriorly dilated, apex obtuse-pointed, termen obliquely rounded; leaden-grey; stigmata in one example perceptible, cloudy, darker grey, discal approximated, plical rather before first discal, but usually wholly obsolete; a dark fuscous slightly incurved fascia from $\frac{5}{8}$ of costa to tornus, anteriorly suffused, posteriorly well-defined; two or three cloudy dark fuscous dots on upper part of termen: cilia grey, tips whitish-grey. Hindwings dark fuscous; cilia grey.

Brazil, Santarem, Parintins, Teffé, from August to December; eight specimens.

Compsolechia religata, n. sp.

♂. 10 mm. Head, thorax dark grey, face shining ochreous-whitish. Palpi ochreous-whitish, second joint suffused grey, terminal joint anteriorly grey. Forewings rather narrow, slightly dilated, costa straight, arched posteriorly, apex obtuse, termen obliquely rounded; dark grey, becoming blackish-grey posteriorly; an obscure grey-whitish shade from costa at $\frac{4}{5}$ to tornus, obtusely indented above middle: cilia dark grey. Hindwings dark fuscous; cilia grey, a darker subbasal line.

Peru, R. Napo, in May; one specimen.

Compsolechia ischnoptera, n. sp.

♂. 9–10 mm. Head, thorax dark violet-grey. Palpi whitish, second joint irrorated grey, terminal joint anteriorly dark grey. Forewings narrow, posteriorly slightly dilated, costa slightly sinuate, somewhat bent at $\frac{1}{3}$, apex pointed, termen obliquely rounded; dark violet-grey; a whitish-ochreous apical patch, its edge running from

$\frac{5}{6}$ of costa to tornus, almost straight, enclosing five irregular dark grey praemarginal dots: cilia whitish-ochreous, basal half light ochreous. Hindwings dark fuscous; cilia dark grey.

Brazil, Para, in July; two specimens.

Compsolechia diplolychna, n. sp.

♂. 16 mm. Head dark indigo-blue, face whitish, postorbital-scales yellowish. Palpi whitish-grey, anterior edge of terminal joint dark grey. Thorax dark purple-fuscous, patagia bluish. Forewings rather narrow, slightly dilated, costa faintly sinuate, apex rounded-obtuse, termen obliquely rounded; purple-blackish; a broad deep orange fascia about $\frac{2}{3}$, leaving costal edge dark fuscous, deep metallic-blue pointed streaks from its posterior edge near extremities rather converging and not reaching anterior edge: cilia dark grey. Hindwings blackish, a thinly scaled white blotch in disc before middle; cilia dark grey.

Brazil, Para, in July; one specimen. Allied to *scitella*.

Compsolechia crocodilopa, n. sp.

♂♀. 11–12 mm. Head shining indigo-metallic, orbits yellow-ochreous. Palpi light yellowish-grey. Thorax shining indigo-grey, partially ochreous-tinged. Forewings narrow, slightly dilated, termen slightly rounded, rather oblique; dark fuscous; base narrowly suffused yellow-ochreous; a moderate fascia of ground colour at $\frac{1}{4}$ enclosed by two yellow-ochreous lines, anterior edge subconcave, posterior straight, space between this and base and a broad fascia beyond it shining leaden-metallic; an 8-shaped transverse space at $\frac{4}{5}$ mostly occupied by two shining blue-leaden-metallic spots and enclosed by two irregular transverse yellow-ochreous suffused streaks, first bearing a dark fuscous transverse mark in middle, second interrupted in middle, these tending to be connected on costa by yellow-ochreous suffusion, sometimes cut by a projection from upper metallic spot towards apex; a blue-leaden-metallic terminal streak: cilia whitish, basal third dark grey. Hindwings dark fuscous; cilia grey, suffused darker towards base.

Brazil, Para, in June; Peru, Iquitos, Jurimaguas, in March; five specimens. Allied to *fasciella* Feld.

Compsolechia recta, n. sp.

♂. 10 mm. Head, thorax light grey. Palpi stouter than usual, second joint blackish finely ribbed white, terminal whitish speckled

blackish. Forewings elongate, costa gently arched, apex obtuse, termen obliquely rounded; fuscous, tips of scales whitish, forming a very fine transverse striation; dark brown dots towards costa near base and at $\frac{1}{6}$, an oblique spot crossing fold at $\frac{1}{4}$; stigmata dark brown, discal approximated, plical obliquely before first discal, an indistinct dark brown streak from beneath and before middle to first discal; a gradually broader streak of blackish-brown suffusion along costa from before middle to subterminal line, cut by an oblique white strigula from costa beyond middle; a fine almost straight whitish line from $\frac{4}{5}$ of costa to tornus; two short dark fuscous praemarginal dashes above and below apex: cilia fuscous, pale-speckled, round costa and apex base ochreous within a dark brown line. Hindwings dark fuscous; cilia grey, a darker subbasal line.

Brazil, Teffé, in January; one specimen.

Compsolechia trapezias, n. sp.

♂. 14 mm. Head light grey, face suffused whitish. Palpi second joint blackish finely ribbed white, terminal white, anteriorly blackish speckled white. Thorax light grey, a black spot at posterior extremity. Forewings elongate, costa slightly arched, apex rounded-obtuse, termen obliquely rounded; brownish-ochreous with faint pinkish tinge, whitish-sprinkled in disc, round subterminal line more rosy-ochreous; a black median dot at base; an oblique blackish fasciate streak from dorsum at $\frac{1}{5}$, apex curved over posteriorly and pointed; costal edge blackish just before subterminal line; a very oblique white mark on costa at $\frac{2}{5}$ and an interrupted angulated line on lower $\frac{2}{5}$ of wing to dorsum before tornus, cut by a strong black dash in middle running to near termen: immediately beyond this a rhomboidal black costal blotch extending to near apex; some white praeterminal scales on edges of black dash, a minute white dot above and another below it: cilia dark grey, base whitish within a dark brown subbasal line, tornal area whitish. Hindwings dark fuscous; cilia grey, a darker subbasal shade.

Brazil, R. Trombetas, in September; one specimen. Resembles *rhombica*, but termen of forewings much more oblique.

Compsolechia ambusta Wals.

Having obtained an extensive series of this very variable species, I consider that *brochospila* Meyr. must be merged

in it; it occurs all up the Amazons from Santarem to Jurimaguas.

Compsolechia caryoterma, n. sp.

♂♀. 12 mm. Head, thorax leaden-grey, face more or less whitish, eyes crimson. Palpi whitish, terminal joint anteriorly grey. Forewings rather narrow, slightly dilated, costa faintly sinuate, arched posteriorly, apex obtuse, termen obliquely rounded; dark violet-grey, irregularly sprinkled whitish; a black subcostal streak from base to $\frac{1}{4}$, terminated by a white costal spot and costal area above it suffused white; an obscure streak of dark fuscous suffusion from base of dorsum to disc at $\frac{1}{3}$; a broad irregular dark fuscous fascia from before middle of costa to $\frac{2}{3}$ of dorsum, in ♂ partially suffused brown in disc; in ♂ veins on posterior half purplish, and costa brown from middle to $\frac{3}{4}$; an irregular variably interrupted white line from $\frac{3}{4}$ of costa to tornus; a brown marginal streak round posterior part of costa and termen, tending to be toothed on veins, and preceded by some whitish interneural dots more developed in ♂: cilia grey, a dark fuscous basal line. Hindwings dark fuscous; cilia grey, a dark grey basal line.

Brazil, Obidos, Parintins, in September and October; two specimens. Allied to *ambusta*.

Compsolechia scholias, n. sp.

♀. 14 mm. Head, thorax leaden-grey, face whitish-suffused, eyes crimson. Palpi grey-whitish, terminal joint grey anteriorly. Forewings rather narrow, slightly dilated, costa faintly sinuate, somewhat bent at $\frac{3}{4}$, apex obtuse, termen obliquely rounded; dark grey, posteriorly purple-tinged; a black subcostal streak from base to $\frac{1}{4}$, terminated by a suffused white spot; an indistinct dark fuscous streak from dorsum near base to disc at $\frac{1}{3}$, some whitish suffusion about fold beyond this; a blackish elongate blotch on middle of costa, whence an oblique blackish streak runs to and surrounds a white mark in disc at $\frac{2}{3}$; a blackish streak along posterior half of fold, preceded by a small spot of white suffusion, at tornus meeting a suberect dark fuscous spot; an irregular white line from $\frac{3}{4}$ of costa to tornus, stronger on costa, somewhat interrupted in middle; several small whitish praemarginal dots round apex: cilia white, a dark grey basal shade. Hindwings dark fuscous; cilia as in forewings.

Peru, Jurimaguas, in March; one specimen. Allied to preceding.

Compsolechia mniocosma, n. sp.

♂. 15 mm. Head, thorax pale green, lower part of face suffused whitish, two small blackish spots on thorax, edge of shoulder black. Palpi second joint dark fuscous finely ribbed white, terminal white, anteriorly dark fuscous speckled whitish. Middle tibiae tufted with rough scales towards apex above. Forewings elongate, costa almost straight, apex rounded, termen obliquely rounded; moss-green, whitish-tinged towards base, more bluish-tinged towards dorsum and termen; a deep green dot near base in middle; a deep green rather oblique fasciate streak from dorsum towards base reaching more than half across wing, posterior edge forming a triangular prominence on fold, edged white and continued as a suffused white line along fold; stigmata obscurely deeper, discal approximated, plical before first discal; a fine white very oblique strigula from costa at $\frac{3}{4}$; a streak of irregular white suffusion from disc at $\frac{3}{4}$ to costa before apex, beneath this an oval black spot almost at apex; five white praeterminal dots, between second and third a fine black dash: cilia dark grey, prominent at apex, base whitish within a dark fuscous line, tornal area whitish. Hindwings dark fuscous; a light grey expansible hairpencil lying in submedian groove; cilia grey, a darker subbasal line.

Peru, Jurimaguas, in March; two specimens.

Compsolechia trachycnemis, n. sp.

♂♀. 14–16 mm. Head, thorax greyish-ochreous, face suffused whitish, eyes crimson. Palpi second joint blackish finely ribbed white, terminal white, anteriorly blackish speckled white. Middle tibiae tufted with dense rough scales above towards apex, rosy-tinged. Forewings rather narrow, hardly dilated, costa straight, apex rounded-obtuse, termen obliquely rounded; ochreous-grey, dorsal $\frac{2}{5}$, a median streak to termen beneath apex with a branch to dorsum before tornus, a streak beneath costa from middle to apex, and sometimes dorsal area suffused ochreous-whitish; an irregular blackish mark from costa at base; a transverse blackish fascia from dorsum at $\frac{1}{5}$ not reaching costa; an almost blackish praemarginal dot above apex and two below apex, preceded by whitish linear marks: cilia ochreous-fuscous, base within a darker line whitish. Hindwings dark fuscous; in ♂ an expansible greyish hairpencil lying in anterior half of submedian groove; cilia grey, a dark grey subbasal shade.

Peru, Jurimaguas, Iquitos, in March; fifteen specimens.

Compsolechia sesamodes, n. sp.

♂. 15 mm. Head, thorax dark grey, face whitish. Palpi second joint blackish finely ribbed white, terminal white, anteriorly blackish speckled white. Forewings rather narrow, slightly dilated, costa almost straight, posteriorly arched, apex obtuse, termen rounded, rather oblique; dark grey; a blackish spot towards costa near base; a transverse blackish fascia from dorsum at $\frac{1}{5}$ not reaching costa, outer edge angulated on fold; plical and first discal stigmata indicated by elongate blackish spots, both followed by spots of white irroration, some white irroration towards costa above these; a fascia of blackish suffusion preceding subterminal line; a fine transverse white mark from costa beyond $\frac{3}{4}$, and small groups of two or three white scales forming a series from this to dorsum before tornus, angulated in middle of wing, rather incurved on lower half; apical area suffused dark brown, an oval black spot beneath costa near apex, an indistinct blackish praeterminal dot beneath apex, two linear white praeterminal dots above this and four minute ones below it: cilia fuscous, dark brown basal and dark fuscous apical lines rather prominent at apex. Hindwings dark fuscous; a long pale greyish expansible hairpencil lying in submedian fold, longer than half wing; cilia grey, a dark fuscous basal line.

Peru, Jurimaguas, in March; one specimen.

Compsolechia niphocentra, n. sp.

♂♀. 12–14 mm. Head grey, face ochreous-whitish. Palpi second joint blackish finely ribbed white, terminal blackish speckled white, posteriorly white. Thorax grey, sometimes two blackish dorsal spots. Forewings rather narrow, slightly dilated, costa almost straight, rather arched posteriorly, apex rounded-obtuse, termen rather obliquely rounded; dark grey, slightly whitish-speckled; a small black spot towards costa at base; a round black spot on fold at $\frac{1}{5}$; stigmata indicated by whitish dots, sometimes little apparent, plical beneath first discal; an oblique white strigula from costa at $\frac{3}{4}$, whence a fine incomplete line of white scales runs to dorsum before tornus, acutely angulated in middle, often little marked above this, rather incurved on lower half; a roundish blackish spot near costa before apex, usually edged white above, and four white elongate dots before upper part of termen, between second and third a slight usually indistinct blackish mark towards termen: cilia dark fuscous, a pale greyish-ochreous basal line, some whitish suffusion on tornus. Hindwings dark fuscous; in ♂ a slender ochreous-

whitish hairpencil in subdorsal groove; cilia grey, a darker basal shade.

Brazil, Teffé, in December and January; Peru, Iquitos, March to May; fourteen specimens.

Compsolechia volubilis, n. sp.

♂♀. 11 mm. Head grey, face suffused whitish. Palpi second joint blackish finely ribbed white, terminal white, anteriorly blackish speckled white. Thorax grey, two black dorsal spots. Forewings elongate, slightly dilated, costa almost straight, rather bent at $\frac{3}{4}$, apex obtuse, termen rather obliquely rounded; dark grey, more or less irregularly irrorated whitish; two small black spots towards costa near base, and a black mark above base of dorsum; an oblique black blotch crossing fold at $\frac{1}{4}$; stigmata blackish, discal approximated, plical rather before first discal; a well-defined whitish line from $\frac{3}{4}$ of costa to dorsum before tornus, sinuate inwards on upper half, preceded by broad blackish suffusion on costa and sometimes throughout, or in one specimen by a brownish tinge in disc; apical area irregularly mixed whitish, towards costa tinged brownish, a wedgeshaped black mark resting on costa near apex, two black dashes reaching margin beneath apex: cilia dark fuscous, a whitish basal line and tornal patch. Hindwings dark fuscous; in ♂ a rather short expansible grey hairpencil lying in a grey-whitish patch in submedian groove; cilia grey, a darker subbasal shade.

Peru, R. Napo, in May; three specimens. The form of subterminal line is characteristic.

Compsolechia eurygypsa, n. sp.

♂♀. 8–9 mm. Head, thorax grey, face ochreous-whitish. Palpi second joint blackish finely ribbed white, terminal white, anteriorly blackish speckled white. Forewings rather narrow, costa almost straight, posteriorly somewhat arched, apex rounded-obtuse, termen obliquely rounded; 7 absent; grey; a blackish dot towards costa at base; a rounded blackish spot on fold at $\frac{1}{4}$; stigmata cloudy, obscurely darker, sometimes with one or two adjacent lateral whitish scales, plical beneath first discal; a strong irregular white line from $\frac{4}{5}$ of costa to tornus, preceded by a broad fascia of dark fuscous suffusion, in two specimens line less developed and interrupted beneath costa; beyond this a dark fuscous streak or irregular patch along costa, and three rather large white praeterminal dots, sometimes absorbed in ochreous-whitish suffusion occupying apical

area except margins: cilia fuscous, base whitish. Hindwings dark fuscous; cilia grey, a darker subbasal shade.

Peru, Jurimaguas, in March; eight specimens. Abnormal in the absence of vein 7 (which is constant, and no instance has been observed in any other species), but in all other respects a characteristic *Compsolechia*.

Compsolechia antiplaca, n. sp.

♂♀. 12–14 mm. Head grey, face sometimes whitish. Palpi second joint blackish finely ribbed white, terminal white, anteriorly blackish speckled white. Thorax grey, sometimes two small black dorsal spots. Forewings elongate, slightly dilated, costa almost straight, posteriorly arched, apex obtuse, termen obliquely rounded; dark grey, slightly whitish-speckled; two small blackish spots beneath costa towards base and one above fold at $\frac{1}{4}$, often obsolete; a black spot beneath fold at $\frac{1}{5}$, always present but variable in size; stigmata sometimes blackish, often obsolete, discal approximated, plical rather before first discal; some dark fuscous suffusion on costa before subterminal line; a white line from $\frac{3}{4}$ of costa to dorsum before tornus, very obtusely angulated above middle and somewhat interrupted above this, beyond interruption a black oblong spot reaching costa near apex, adjoining line immediately beneath this an ochreous-white blotch not reaching termen, crossed by two black dashes, rarely a third indicated above these: cilia dark fuscous, a fine whitish basal line, tornal area ochreous-whitish. Hindwings dark fuscous; in ♂ a slender greyish hairpencil in submedian fold; cilia grey, a darker subbasal shade.

Brazil, Teffé; Peru, Jurimaguas, Iquitos; from December to May, twenty-two specimens.

Compsolechia tetrortha, n. sp.

♂♀. 12 mm. Head, thorax grey, face sometimes whitish. Palpi second joint black finely ribbed white, terminal white, anteriorly black speckled white. Forewings rather narrow, slightly dilated, apex obtuse, termen rather obliquely rounded; grey, sometimes irregularly sprinkled whitish; cloudy blackish dots beneath costa near base and at $\frac{1}{5}$; an oblique blackish streak from near dorsum at $\frac{1}{6}$ crossing fold; stigmata obscure, cloudy, blackish-grey, discal approximated, plical rather before first discal; a nearly straight fine whitish line from $\frac{1}{5}$ of costa to tornus, preceded by a fascia of brownish suffusion (with slight pinkish tinge) expanded and becoming

dark fuscous towards costa; between this and termen ground-colour more or less ochreous or brownish, with four well-marked black dashes, uppermost thickest, between and sometimes round these more or less whitish suffusion: cilia prominent at apex, dark fuscous or brownish, base ochreous-whitish with a dark shade, towards tornus more or less suffused whitish. Hindwings dark fuscous; submedian fold in ♂ filled with long grey hairs; cilia grey, a dark fuscous subbasal shade.

Brazil, Teffé; Peru, Jurimaguas; from December to March, twenty-six specimens. Nearly allied to *repandella* = *diortha* (of which I have now received more than 100 specimens, ranging from Para to Iquitos), but I believe it is distinct; the more prominent apical cilia give a characteristic aspect, but this is lost if the specimens are not well-preserved. Examples of this species are included in the British Museum with *subscriptella*, but the type of that species = *repandella*.

Compsolechia ptochogramma, n. sp.

♂. 10 mm. Head light grey, face whitish. Palpi second joint blackish finely ribbed white, terminal white, anteriorly blackish speckled white. Thorax light grey, two small black dorsal spots. Forewings rather narrow, costa almost straight, somewhat arched posteriorly, apex rounded-obtuse, termen very obliquely rounded; grey, more or less irrorated whitish on an oblique area from middle of costa to tornus; black dots towards costa at base and $\frac{1}{6}$; a thick very oblique black streak from dorsum at $\frac{1}{6}$ crossing more than half wing; stigmata small, indistinct, dark fuscous, discal approximated, plical obliquely before first discal; a patch of dark fuscous suffusion on costa preceding subterminal line, this represented by a white dot on costa at $\frac{3}{4}$, and a transverse series of several minute whitish dots beyond it on lower half of wing; immediately beyond this a triangular blackish costal blotch, adjoining which beneath is a white blotch not reaching margin crossed by two black dashes: cilia dark fuscous, a whitish basal line, towards tornus ochreous-whitish mixed fuscous. Hindwings dark fuscous; a short slender grey hairpencil in submedian fold; cilia grey, a darker subbasal shade.

Brazil, Para, in July; four specimens.

Compsolechia stillata, n. sp.

♂♀. 11–12 mm. Head, thorax grey, face suffused whitish. Palpi second joint blackish finely ribbed white, terminal white, anteriorly blackish speckled white. Forewings rather narrow, costa

faintly sinuate, posteriorly arched, apex rounded-obtuse, termen obliquely rounded; iridescent light brownish-ochreous, more or less irregularly mixed or wholly suffused grey except apical area, and sprinkled dark fuscous; some irregular small spots of dark fuscous suffusion anteriorly, and stigmata sometimes similarly indicated, plical somewhat before first discal; costal edge more or less suffused dark fuscous, sometimes more broadly towards subterminal line; an irregular tornal blotch of dark fuscous suffusion; an obtusely angulated series of small irregular whitish dots from $\frac{3}{4}$ of costa to tornus; a short praemarginal white dash before apex, a black dash above it and two below it: cilia from brownish-ochreous to grey, base within a dark grey subbasal line ochreous-whitish, some ochreous-whitish suffusion on tornus. Hindwings dark fuscous; in ♂ a large expansible grey hairpencil lying in submedian groove; cilia grey, a darker subbasal line.

Brazil, Parintins, in October; Peru, Jurimaguas, Iquitos, March to May; seven specimens. Near *anthracura*.

Compsolechia phepsalitis, n. sp.

♂. 10 mm. Head, thorax grey, face whitish. Palpi second joint dark grey finely ribbed white, terminal whitish, anteriorly dark grey. Forewings rather narrow, costa almost straight, somewhat arched posteriorly, apex rounded-obtuse, termen obliquely rounded; dark purplish-grey, suffused chestnut-brown in disc posteriorly; a dark fuscous median streak from near base to $\frac{2}{3}$, expanded downwards into a blotch at $\frac{1}{3}$; stigmata cloudy, dark fuscous, plical rather before first discal, second discal centred chestnut-brown; an oblique white strigula from costa at $\frac{1}{3}$, and two minute white dots above tornus; a roundish blackish spot resting on costa near apex, adjacent beneath this a moderate white dot and then a minute one: cilia dark grey, base mixed dark fuscous. Hindwings dark fuscous; cilia fuscous, darker towards base.

Brazil, Teffé, in January; one specimen.

Compsolechia drachmaea, n. sp.

♂♀. 17–18 mm. Head, thorax grey, face whitish-grey. Palpi second joint blackish finely ribbed white, terminal white, anteriorly blackish speckled white. Forewings rather narrow, slightly dilated, costa almost straight, arched posteriorly, apex obtuse, termen nearly straight, somewhat oblique; rather dark violet-grey, slightly whitish-speckled; dorsal area suffused blackish from near base to near tornus; a fine rather irregular hardly curved whitish line from beyond $\frac{3}{4}$ of costa to dorsum before tornus, a minute

whitish dash beyond this in middle; apical area dark brown, a round black spot resting on costa near apex, adjoining this beneath a large white dot, a blackish praeterminal dot beneath apex with small adjacent white dots above and beneath and two other white dots beneath it, but these four white dots sometimes obsolete: cilia dark ashy-grey, basal and apical dark fuscous shades, at apex rather prominent, beneath tornus whitish. Hindwings dark fuscous; cilia grey, a darker subbasal line.

Brazil, Teffé, in January; five specimens.

Compsolechia rhombica, n. sp.

♂. 14 mm. Head light grey, face suffused ochreous-whitish. Palpi second joint blackish finely ribbed white, terminal white, anteriorly blackish speckled white. Thorax light grey, a black spot at posterior extremity. Forewings elongate, costa almost straight, slightly bent at $\frac{4}{5}$, apex obtuse, termen rounded, somewhat oblique; grey suffused whitish, beyond a line from before middle of costa to $\frac{3}{4}$ of dorsum ochreous-brown, two whitish spots obliquely placed in dise on division; a black dot on base of costa; a thick blackish very oblique curved streak from dorsum near base to dise near middle, apex pointed; costal edge just before subterminal line blackish; a fine whitish line from $\frac{3}{5}$ of costa to dorsum before tornus, acutely angulated in middle, both halves slightly incurved, angle cut by a fine blackish line from beyond middle of dise to termen; immediately beyond this a rhomboidal blackish spot on costa extending nearly to apex; short white praeterminal markings edging a black subapical line, another above this and two below them: cilia brownish, base white within a dark brown subbasal line, on costa grey, rather prominent at apex, on tornus whitish. Hindwings dark fuscous; cilia grey, a darker subbasal line.

Peru, Iquitos, in May; one specimen. Allied to *binotatella.*

Compsolechia pungens, n. sp.

♂♀. 16–18 mm. Head, thorax light bronzy-fuscous, face paler. Palpi second joint blackish finely ribbed white, terminal whitish, anteriorly dark fuscous speckled white. Forewings elongate, slightly dilated, costa slightly arched, somewhat bent at $\frac{3}{4}$, apex obtuse, termen slightly rounded, somewhat oblique; fuscous, slightly speckled whitish; a very oblique thick streak of dark brown suffusion from dorsum at $\frac{1}{4}$ reaching more than half across wing, limiting a basal patch of ochreous-brown suffusion not reaching costa and edged

above by a small cloudy spot of dark fuscous suffusion at base, and an indistinct slender very oblique streak from costa near base to its posterior extremity; a small obscurely darker spot in middle of disc; some brown suffusion along median area of costa, terminated by a suffused dark brown spot preceding subterminal line; a fine whitish line from $\frac{3}{4}$ of costa to dorsum before tornus, angulated in middle, upper half incurved, lower straight or slightly dentate beneath angle, a short dash projecting from angle towards a short black praeterminal dash; apical area light brownish, a thick ochreous-brown marginal streak round posterior part of costa and termen, an oval black spot lying in this above apex: cilia brownish, a dark ochreous-brown subbasal line, extreme base whitish. Hindwings dark grey; cilia grey, a darker subbasal shade.

Peru, Iquitos and R. Napo, March to May; three specimens. Very near *incurva* (which I have also from Santarem, Jurimaguas, and Iquitos), but certainly distinct; in *incurva* the dark streak from dorsum at $\frac{1}{5}$ is little oblique, the enclosed basal area dark grey, the angle of subterminal line not produced.

Compsolechia erebodelta, n. sp.

♀. 17 mm. Head fuscous, face pale. Palpi whitish, second joint finely ribbed dark fuscous, basal fourth dark fuscous, terminal joint anteriorly dark fuscous minutely speckled whitish. Thorax fuscous, posterior extremity blackish. Forewings elongate, slightly dilated, costa almost straight, bent at $\frac{3}{4}$, apex obtuse, termen rather obliquely rounded; brownish, slightly speckled whitish; a blackish dot on base of costa; a rather irregular thick blackish transverse streak from dorsum at $\frac{1}{5}$ reaching $\frac{2}{3}$ across wing; costa suffused dark brown from middle to $\frac{3}{4}$; a fine indistinct ochreous-whitish line from $\frac{3}{4}$ of costa to dorsum before tornus, angulated in middle, both halves incurved; a subtriangular black spot on costa before apex; two small black dots before upper part of termen, connected with subterminal line by very fine ochreous-whitish dashes: cilia whitish-ochreous, a dark brownish antemedian line, outer half rather dark brown on costa and upper part of termen. Hindwings dark grey; cilia grey, a dark grey subbasal shade.

Peru, Jurimaguas, in March; one specimen.

Compsolechia tornoptila, n. sp.

♂. 18 mm. Head, thorax brownish-grey, apical half of patagia brownish. Palpi dark grey, terminal joint posteriorly whitish.

(Abdomen missing.) Forewings elongate, costa gently arched, apex obtuse, termen obliquely rounded; grey; an oblique streak of brown suffusion from dorsum towards base reaching $\frac{2}{3}$ across wing; discal and dorsal areas suffused brownish from $\frac{1}{3}$ to near termen, a suffused dark brown streak from disc at $\frac{1}{3}$ to termen beneath apex, below this a paler area posteriorly, brown streaks on veins 8–11 except towards costa: cilia brown. Hindwings dark grey, paler towards base; cilia light brownish, a grey subbasal shade, dorsal cilia forming a long expansible hairpencil.

Brazil, Teffé, in December; one specimen. Perhaps allied to *stasigastra*; if so, the abdomen may be distinctively coloured as in that species.

Compsolechia stasigastra, n. sp.

♂. 12 mm.; ♀. 14 mm. Head ♂ whitish-ochreous, ♀ greyish-ochreous, face ochreous-whitish. Palpi ochreous-whitish, terminal joint greyish anteriorly. Thorax light ochreous-greyish. Abdomen base light ochreous, segments 2–5 blackish, remainder whitish-ochreous. Forewings elongate, costa slightly arched, apex obtuse, termen slightly rounded, somewhat oblique; greyish-ochreous or light fuscous, veins 8–11 obscurely darker-streaked; small dark fuscous almost basal dots in middle and on dorsum; a very oblique dark fuscous fasciate blotch from dorsum at $\frac{1}{3}$ reaching more than half across wing; an ill-defined blotch of fuscous suffusion occupying dorsal half from near beyond this to tornus, darkest posteriorly; a very faint small spot of whitish-ochreous suffusion on costa at $\frac{4}{5}$; very indistinct small marginal dots of dark fuscous suffusion round apex and termen: cilia grey, base within a dark fuscous shade light ochreous. Hindwings ♂ grey, ♀ dark grey; cilia grey-whitish, a light greyish subbasal shade becoming thickened and blackish on lower part of termen towards tornus.

Brazil, Obidos, in August; two specimens.

Compsolechia loxogramma, n. sp.

♂. 12–13 mm. Head grey, face whitish-mixed. Palpi whitish, second joint with suffused dark grey spot above towards apex, terminal joint irrorated dark grey anteriorly. Thorax grey, some variable small blackish spots anteriorly. Abdomen blackish-grey, a whitish-ochreous pracapical band. Forewings narrow at base, somewhat dilated, costa faintly sinuate, rather bent at $\frac{3}{4}$, apex

obtuse-pointed, termen rounded, somewhat oblique; leaden-grey; a blackish dot on base of costa; a blackish rather oblique streak from base of dorsum not reaching costa; an angulated transverse blackish streak at $\frac{1}{5}$ sometimes variably interrupted; an ochreous subcostal streak from near base to middle interrupted by this; a blackish fascia from middle of costa to before middle of dorsum, narrowed in disc and preceded by ochreous suffusion, broader towards dorsum and followed on dorsum by a suffused white spot, sometimes nearly obsolete; beyond this a short dark fuscous mark in disc and one on fold; a triangular blotch of blackish suffusion on dorsum about $\frac{3}{4}$; a slightly irregular oblique whitish line from costa at $\frac{3}{4}$ to tornus, space between this and preceding forming a fascia of pale yellow-ochreous suffusion; apical area beyond this line wholly suffused blackish: cilia ashy-grey, two dark fuscous shades. Hindwings dark fuscous; cilia grey, a dark fuscous subbasal shade.

Brazil, Obidos, Parintins, August to October; nine specimens.

Compsolechia neurophora, n. sp.

♂♀. 18–19 mm. Head shining dark indigo-blue-fuscous, face suffused whitish-ochreous, supraorbital scales whitish-yellowish. Palpi ochreous-whitish, terminal joint grey anteriorly. Thorax dark purple-grey. Forewings elongate, costa slightly arched, apex obtuse, termen rounded, rather oblique; deep purple, more or less sprinkled grey-whitish, on posterior fourth of wing veins 3–7 marked with light greyish streaks, 2 and 8 slightly indicated: cilia pale purplish-bronzy, a grey subbasal shade. Hindwings dark fuscous; cilia grey, a darker basal shade.

Brazil, Teffé, in December; four specimens.

Compsolechia dryocrossa, n. sp.

♂. 16–17 mm. Head, palpi, thorax fuscous, pale-speckled, terminal joint of palpi ochreous-whitish posteriorly. Forewings elongate, somewhat dilated, costa almost straight, rather bent at $\frac{4}{5}$, apex obtuse, termen rounded, somewhat oblique; ochreous-fuscous, irrorated ochreous-whitish; costal edge fuscous from base to $\frac{3}{4}$; indistinct fuscous dots above fold near base and at $\frac{1}{5}$; stigmata very indistinct, cloudy, fuscous, discal approximated, plical slightly before first discal; a very faint paler shade, hardly traceable, from $\frac{1}{5}$ of costa to tornus, indented above middle: cilia light

ochreous-brown. Hindwings dark grey; cilia grey, a darker basal line.

Brazil, Para, Parintins, in July and October; two specimens.

Coleostoma, n. g.

Head with appressed scales, sidetufts somewhat raised; ocelli small, posterior; tongue developed. Antennae nearly 1, basal joint moderately elongate, without pecten. Labial palpi very long, recurved, second joint broadly thickened with dense scales, slightly expanded at apex above, terminal joint as long as second, thickened with dense scales roughly projecting posteriorly except at apex, pointed. Maxillary palpi short, loosely scaled, appressed to tongue. Posterior tibiae shortly rough-scaled above. Forewings 1*b* furcate, 2 from towards angle, 3 from before angle, 4 and 5 approximated, 7 and 8 stalked, 7 to costa, 11 from middle. Hindwings somewhat over 1, trapezoidal-ovate, apex obtuse, termen faintly bisinuate, cilia $\frac{1}{2}$; 3 and 4 connate, 5 approximated, 6 and 7 closely approximated towards base.

Affinity rather uncertain, but perhaps allied to *Compsolechia*, notwithstanding the different palpi.

Coleostoma entryphopa, n. sp.

♀. 15 mm. Head light greyish, sidetufts dark fuscous. Palpi deep ferruginous, second joint with three indistinct grey-whitish rings, tip of terminal joint whitish. Thorax dark grey, shoulders and a posterior spot suffused deep ferruginous. Forewings elongate, costa gently arched anteriorly, then nearly straight, apex rounded, termen rounded, somewhat oblique; light brownish-grey; base narrowly dark ferruginous-fuscous, followed by slight whitish suffusion; an irregular ferruginous streak along dorsum; a triangular ferruginous area, pointed anteriorly, extending along costa from $\frac{2}{5}$ and gradually expanded to cover termen and tornus, marked with a deeper ferruginous streak from below middle of its lower edge to apex of wing, a minute white costal dot just before this: cilia pale greyish-ochreous, basal half ferruginous, somewhat prominent at apex, on costa two ferruginous lines towards tips indicating slight projecting hooks, a fine white strigula on praeapical dot. Hindwings dark fuscous; cilia grey, a darker subbasal line, some pale suffusion opposite apex.

Brazil, Obidos, in August; one specimen.

Strobisia Clem.

In the case of this genus, and also in the allied *Zalithia* and *Helcystogramma*, I find it impossible to rely on the presence of vein 7 of forewings as a generic or even as a specific character; in the typical species of *Strobisia* 7 and 8 are coincident, but in others (which for that reason I had referred to *Zalithia*) they are stalked, and again in others (as in *subvectella* Walk.) they are stalked or coincident indiscriminately. A further variation of structure is found in the palpi, of which the second joint is quite smooth in typical *Strobisia*, but in other species (as described below) loosely rough-scaled above; these species are, however, so closely allied that they will not bear generic separation. Hence I am constrained to find a more natural separation between the genera in the proportional breadth of the hindwings, which in *Strobisia* are about equal in width to the forewings, whilst in *Zalithia* they are obviously broader than the forewings; this definition allows all the species with the characteristic blue-metallic markings of *Strobisia* to be classed together. Similarly in *Zalithia walkeri* Wals. (of which I have a long series), an insect of very different superficial character to the above, veins 7 and 8 are found either stalked or coincident with nearly equal frequency.

Strobisia trissoxantha, n. sp.

♀. 12–13 mm. Head glossy dark blue-grey. Palpi smooth, orange-yellow, terminal joint dark grey. Thorax dark purple-fuscous, with two orange stripes meeting behind. Forewings elongate, apex obtuse, termen obliquely rounded; 7 absent; dark purple-fuscous; a rather oblique orange streak from costa near base not reaching dorsum; three moderate orange transverse fasciae, first at ¼, marked with one or two dark dots, second beyond middle, irregularly obliquely interrupted below middle, third almost terminal, leaving a slender terminal streak on which are three orange dots; alternating with these are three broad glossy dark leaden fasciae occupying whole space except narrow irregular streaks margining fasciae: cilia violet-grey, on termen outer half yellow-whitish. Hindwings dark fuscous; cilia grey with darker basal shade, towards tips whitish-grey on upper part of termen.

Peru, Jurimaguas, in March; Brazil, Teffé, in January; three specimens. Of quite peculiar facies, yet structurally a typical *Strobisia*.

Strobisia helicopis, n. sp.

♂♀. 12–13 mm. Head, thorax grey. Palpi second joint whitish-grey, towards apex violet-grey, scales somewhat expanded towards apex above, terminal joint whitish, anterior edge dark grey. Forewings elongate, posteriorly dilated, apex rounded-obtuse, termen nearly straight, somewhat oblique; blackish; extreme base grey; a narrow irregular grey subbasal fascia, on costa metallic-blue; beyond this an irregular metallic-blue transverse line not reaching costa; an oblique metallic-blue streak from a white dot on costa at $\frac{2}{5}$ to middle of wing; an irregular zigzag metallic-blue transverse line at $\frac{3}{5}$, not reaching costa; a nearly straight grey line from a white dot on costa at $\frac{3}{5}$ to dorsum at $\frac{3}{4}$; a pale iridescent-grey marginal line round apex and termen, preceded by an irregular-edged narrow metallic-blue fascia: cilia leaden-grey, at and above apex with a white basal streak dilated upwards. Hindwings dark fuscous; cilia white, a dark grey subapical patch, a dark fuscous basal shade, on dorsum wholly grey. Hindwings beneath with white blotch on costa beyond middle.

Brazil, Para, Obidos, in July and August; Peru, Jurimaguas, in March; three specimens.

Strobisia spintheropis, n. sp.

♂♀. 10–11 mm. Head, thorax dark bronzy-fuscous, face paler. Palpi white speckled fuscous, anterior edge dark fuscous, scales of second joint somewhat expanded above, terminal joint longer. Forewings elongate, posteriorly dilated, apex obtuse-pointed, termen sinuate beneath apex, somewhat oblique; dark bronzy-fuscous; markings bright metallic-blue; discal and subdorsal dots towards base, an oblique spot beneath costa at $\frac{1}{4}$; a dot beyond apex of this, small subdorsal spots at middle and $\frac{3}{4}$, and one in disc between these, an oblique streak from costa in middle and a slenderer one at $\frac{3}{4}$, and a dot in disc at $\frac{3}{4}$; a thick purple-metallic streak along termen: cilia on costa dark fuscous with apical hook, on termen white with dark fuscous subbasal line, on tornus grey. Hindwings dark fuscous; cilia grey, tips whitish. Hindwings beneath with slight whitish mark on middle of costa only.

Brazil, Parintins, in October; four specimens.

Zalithia caeligena, n. sp.

♂♀. 12–13 mm. Head, thorax deep blue, lower part of face in ♂ ochreous-whitish, in ♀ bluish-grey. Palpi ochreous-whitish,

terminal joint anteriorly suffused dark grey. Antennae deep purple, a broad white subapical band. Forewings narrow, termen rounded, rather strongly oblique; fulvous-orange; a deep blue basal patch, limited by an oblique blackish streak from $\frac{1}{3}$ of costa to middle of dorsum, a spot of blackish suffusion on base of costa; three light silvery-blue longitudinal streaks, first along costa from before middle to $\frac{4}{5}$, second in disc from about middle to near apex, partially and variably edged with some blackish marking anteriorly and in ♀ also posteriorly, third beneath fold from basal patch to tornus, edged blackish suffusion; in ♂ a terminal fascia of deep brown-reddish suffusion: cilia grey, base in ♂ brown-reddish. Hindwings dark fuscous; cilia grey, basal third darker.

Brazil, Parintins, Teffé, October to December; five specimens.

Zalithia sacricola, n. sp.

♂♀. 12–13 mm. Head, thorax dark indigo-blue-grey, face whitish. Palpi whitish, anteriorly and at apex of second joint suffused dark grey. Forewings rather narrow, somewhat dilated, termen slightly rounded, rather oblique; glossy dark indigo-blue-leaden; an orange oblong blotch on dorsum beyond middle, upper angles with rather diverging fasciate lobes not reaching costa, posterior including a transverse-linear dark fuscous mark; an angulated orange transverse line at $\frac{4}{5}$, and narrow orange terminal fascia, these sometimes suffused together or with anterior portion in disc variably suffused with dark fuscous, sometimes dark fuscous dots on marginal edge: cilia orange, base sometimes spotted dark fuscous. Hindwings dark fuscous; cilia grey, a dark grey basal shade.

Brazil, Teffé; Peru, Iquitos, Jurimaguas; December to March, five specimens.

Zalithia rhodopetala, n. sp.

♂♀. 15–16 mm. Head, thorax indigo-blue, face greyish. Palpi grey, terminal joint bluish-tinged. Forewings narrow, slightly dilated, termen rather obliquely rounded; blackish; basal $\frac{2}{5}$ suffused dark blue except on costa; an incomplete narrowly transverse-oval whitish ring before middle from beneath costa to below fold; a narrow shining indigo-blue postmedian fascia not quite reaching margins, expanded posteriorly towards dorsum, and an oval blotch in disc at $\frac{3}{4}$ not reaching margins; a triangular whitish spot on costa at $\frac{4}{5}$ followed by a small blackish spot and in one specimen sending

a fine whitish transverse line to dorsum before tornus, apical fifth of wing beyond these markings forming a coppery-red blotch with violet gloss: cilia grey, a white apical patch. Hindwings dark fuscous; cilia grey, a dark fuscous subbasal shade.

Brazil, Obidos, Parintins, in September and October; five specimens.

Zalithia ioploca, n. sp.

♀. 15 mm. Head whitish-grey, face whitish. Palpi whitish-violet, terminal joint longer than second, violet-grey anteriorly. Thorax violet-grey. Forewings rather narrow, costa faintly sinuate beyond middle, apex rounded, termen rounded, little oblique; violet-grey, on costal half anteriorly suffused sky-blue, extreme costal edge whitish; subcostal, median, and plical orange lines from base to near middle, and a line from base of median to apex of subcostal; these terminated by an angulated dark grey bar in middle of disc, edged orange and pale ochreous suffusion; posterior area from near beyond this light ochreous suffused orange in disc, towards dorsum anteriorly forming streaks on veins and tinged crimson, including a dark ferruginous dot on end of cell, two short oblique dark grey marks from costa before and beyond $\frac{3}{4}$ and one just above apex, a deep ferruginous transverse line at $\frac{7}{8}$ edged anteriorly by white marks below costa and below middle, and limiting a deep ferruginous blotch extending along termen, becoming purplish towards its middle (cilia imperfect). Hindwings dark fuscous; cilia grey, a darker subbasal shade.

Brazil, Parintins, in October; one specimen.

Helcystogramma chalyburga, n. sp.

♀. 13 mm. Head, thorax fuscous. Palpi pale brownish-ochreous, anterior edge of terminal joint ochreous-whitish finely edged blackish. Forewings elongate, apex rounded-obtuse, termen rounded, little oblique; brown; three shining dark blue-grey fasciae finely edged blackish, first basal, occupying $\frac{1}{3}$ of wing, second moderate, rather irregular, from middle of costa to beyond middle of dorsum, third subterminal, moderate, pointed beneath and not quite reaching dorsum, costal end marked anteriorly with a small white spot; dorsum between fasciae suffused dark fuscous; terminal area dark fuscous, a terminal series of minute blue-grey dots: cilia grey, a darker basal shade. Hindwings dark fuscous; cilia whitish, a dark grey basal shade.

Brazil, Para, in June; two specimens.

Helcystogramma carycastis, n. sp.

♂. 10–12 mm. Head glossy grey, sidetufts tinged ferruginous. Palpi pale bronzy-grey. Thorax greyish-ferruginous, a white stripe on outer side of patagia. Forewings rather narrow, apex obtuse, termen slightly sinuate beneath apex, little oblique; deep ferruginous or red-brown; a white streak along fold from base to near middle of wing, in one example marked at base with a short dark grey streak; a streak of dark fuscous suffusion along dorsum throughout, in one example extending to white streak; two light metallic-grey fasciae edged blackish, first from middle of costa, at first very broad and extended as a slender whitish streak to base, rapidly narrowed to dorsal suffusion at $\frac{2}{3}$, finely white-edged anteriorly except towards costa, and more strongly posteriorly expanding into a triangular white costal spot, second at $\frac{4}{5}$, narrow, constricted in middle, irregularly white-edged, forming a white spot beneath costa posteriorly; costal edge towards apex white; a light metallic-grey triangular spot on termen below middle, and a slight mark at apex: cilia glossy grey, a ferruginous subbasal line. Hindwings dark grey; cilia grey, a darker subbasal shade.

Brazil, R. Trombetas, in September; British Guiana, Bartica, in February; two specimens. This species shows some interesting affinity with Australian forms of the genus.

Taphrosaris, n. g.

Head with broad appressed scales; tongue developed. Antennae $\frac{1}{5}$, in ♂ strongly ciliated, basal joint elongate, subclavate, without pecten. Labial palpi very long, recurved, basal joint enlarged and much thickened with dense scales, second joint very long, broad, smooth, on inner side hollowed throughout into a deep trough filled with a long dense expansible hairpencil, terminal joint extremely short, filiform. Maxillary palpi very short, filiform, appressed to tongue. Posterior tibiae rough-scaled above. Forewings 2 and 3 stalked, 7 and 8 stalked, 7 to apex, 11 from middle. Hindwings over 1, trapezoidal-ovate, termen hardly sinuate, cilia $\frac{1}{5}$; 3 and 4 connate, 5 somewhat approximated, 6 and 7 stalked.

Allied to *Pachysaris*.

Taphrosaris malthacopa, n. sp.

♂. 20 mm. Head grey. Palpi dark purple-grey, expansible hairpencil whitish. Antennal ciliations $2\frac{1}{2}$. Thorax ashy-grey.

Forewings elongate, costa gently arched, apex rounded-obtuse, termen rounded, somewhat oblique; rather dark violet-ashy-grey; an irregular transverse blackish blotch in disc before middle, sometimes divided into two, upper half somewhat mixed brown, lower half occupied except lateral margins by a brownish-ochreous spot; two blackish dots transversely placed on end of cell, sometimes some pale yellowish scales between these: cilia grey. Hindwings rather dark grey; cilia grey.

Brazil, Teffé, in January; French Guiana, R. Maroni; two specimens.

Pachysaris contrita, n. sp.

♂. 19 mm. Head light grey, sidetufts roughly raised, whitish-ochreous. Palpi dark purple-grey, expanded hairs very dense, light grey. Thorax dark iron-grey. Forewings elongate, costa gently arched, apex rounded, termen rounded, rather oblique; dark iron-grey; stigmata small, dark fuscous, plical beneath first discal, an additional dot beneath second discal: cilia dark grey. Hindwings rather light grey, scales farinose, a darker grey streak along upper part of termen; a short basal pecten of whitish-ochreous scales on 1*b*, and slight one on lower margin of cell; cilia grey.

Brazil, Para, in July; British Guiana, Mallali, in March; two specimens.

Prophoraula, n. g.

Head with appressed scales; ocelli small, posterior; tongue developed. Antennae $\frac{4}{5}$, in ♂ moderately ciliated, basal joint elongate, without pecten. Labial palpi extremely long, straight, porrected, second joint extremely long, rough-scaled above throughout with scales longer towards base, and beneath on posterior half with rough projecting scales becoming longer towards apex, terminal joint very short, filiform, pointed, almost concealed in scales of second. Maxillary palpi obsolete. Posterior tibiae rough-haired above and beneath. Forewings 1*b* furcate, 2 and 3 stalked from angle, 7 absent, 8 and 9 stalked, 11 from beyond middle. Hindwings 1, trapezoidal, termen slightly sinuate, cilia $\frac{2}{3}$; 3 and 4 connate, 5 somewhat approximated, 6 and 7 short-stalked.

Probably a development of *Noeza*.

Prophoraula pyrrhopis, n. sp.

♂♀. 12–16 mm. Head, palpi, thorax ferruginous-orange, palpi in ♂ irrorated dark ferruginous. Forewings elongate, posteriorly slightly dilated, costa somewhat arched posteriorly, apex rounded-obtuse, termen rounded, somewhat oblique; ferruginous-orange, in ♂ sprinkled ferruginous and costa suffused ferruginous: cilia concolorous. Hindwings ♂ dark fuscous, towards base more or less variably suffused orange, ♀ greyish-orange; cilia ♂ grey, sometimes partially suffused dull orange, ♀ light ochreous-orange.

Brazil, Parintins, Teffé, October to December; four specimens.

Noeza gyralea, n. sp.

♀. 10 mm. Head ochreous-whitish, crown suffused light grey. Palpi whitish, second joint with dark blue-grey lateral streak, above with long rough whitish hairs throughout, at apex with ochreous-yellow tuft, terminal joint with blackish subbasal band and fine anterior line on upper half. Thorax violet-grey. Forewings elongate, costa slightly sinuate, apex rounded off, termen rounded, little oblique; deep purple; two red longitudinal lines beneath costa from base to $\frac{1}{3}$; two pairs of short fine orange-reddish lines in disc beneath these; 8-shaped blotches irregularly and interruptedly outlined ferruginous-ochreous in disc before and beyond middle, first connected by suffused marks with costa and dorsum; a curved ferruginous-ochreous subterminal line traversed by four streaks on veins; a ferruginous-ochreous marginal streak round posterior part of costa and termen: cilia ochreous, a deep purple basal shade. Hindwings blackish-grey; cilia grey, a dark grey basal shade.

Brazil, Manaos, in November; one specimen. Allied to *zachroa*.

Trichotaphe, Clem.

Lord Walsingham (Biol. Centr. Amer., iv, 90) unfortunately merged this genus in *Dichomeris*, on the ground that the range of variation in the structure of the palpi makes it impossible (he should have said difficult) to draw any dividing line. There are, however, other points of structural difference between *ligulella* and *setosella*, the two generic types, and in particular the former insect has a strong cubital pecten of hairs in the hindwings, the latter has none. A separation by this character appears to give

results in accordance with natural relationships, and I propose to maintain it accordingly.

Trichotaphe semicuprata, n. sp.

♂. 14 mm. Head, thorax leaden-grey, face whitish. Palpi ochreous-whitish, second joint with scales roughly expanded towards apex above, mixed dark grey with bluish reflections, terminal joint with subbasal band and upper part of anterior edge dark fuscous. Forewings rather narrow, termen rounded, rather strongly oblique; dark violet-grey; a fine yellowish supramedian line from base to ¼, and two slight yellow marks between apex of this and costa; a moderate blackish fascia before middle not reaching dorsum; a coppery-brown-reddish patch occupying nearly apical half of wing, edged anteriorly ochreous-whitish towards costa: cilia fuscous, basal third coppery-reddish, apical third fuscous-whitish. Hindwings dark fuscous; cilia dark grey, basal third dark fuscous.

Peru, Jurimaguas, in March; one specimen.

Trichotaphe porphyrogramma Meyr.

♂♀. 11–13 mm. Palpi second joint with whitish lateral streak, terminal somewhat shorter than second. Forewings pale ochreous, costa, dorsum, and all veins slenderly streaked deep purple, between these ground-colour red towards costa on anterior half, suffused dark ferruginous-brown on posterior third and narrowly along dorsum; dark ferruginous-fuscous pale-edged rather oblique transverse blotches in disc before and beyond middle, posterior narrower: cilia whitish, base within a dark fuscous antemedian shade suffused ferruginous-ochreous, on costa beyond this grey.

British Guiana, Bartica, Mallali, December to February; Brazil, Para, Obidos, Parintins, July to October; Peru, Jurimaguas, Iquitos, in March; fourteen specimens. The original description included examples of other species confused together, and is therefore corrected as above; six of the original examples are included in it. The discal blotches are characteristic and constant.

Trichotaphe habrochitona Wals.

If I have correctly identified this species from the description and figure, the male has the costa of forewings

strongly folded over beneath on anterior half, concealing a patch of modified ochreous scales; in one specimen this fold is expanded, curiously modifying the shape of wing; this structure is not mentioned by the author, but would be easily overlooked. I have the species from Teffé and Bartica.

Trichotaphe euparypha, n. sp.

♀. 11 mm. Head blue-grey, sidetufts yellowish-tinged. Palpi second joint pale violet, tip whitish, scales somewhat expanded above at apex, terminal joint as long as second, dark purple, upper $\frac{2}{3}$ posteriorly whitish. Thorax dark grey. Forewings rather narrow, termen obliquely rounded; deep blue-purple; basal third with 3 or 4 light ochreous longitudinal streaks more or less expressed; transverse dark fuscous blotches in disc before and beyond middle, more or less edged orange-yellowish; an orange streak on posterior part of fold more or less expressed; posterior area from second discal blotch to termen orange, with more or less developed dark fuscous streaks on veins, and a variable dark fuscous apical blotch extending over most of termen: cilia white, on costa and tornus greyish, base orange within a dark fuscous antemedian shade. Hindwings dark fuscous; cilia grey, a dark fuscous basal shade.

Peru, Jurimaguas, in March; two specimens.

Trichotaphe aurisuicata, n. sp.

♂♀. 11–12 mm. Head pale ochreous tinged grey, face more whitish. Palpi second joint greyish-violet, apex white, scales somewhat expanded at apex above, ochreous-yellowish, terminal joint as long as second, white, anterior edge and lower half dark violet-grey. Thorax dark violet-grey, obscure ochreous streaks on each side of back. Forewings rather narrow, termen obliquely rounded; dark violet-fuscous, costa bluer-tinged; variable more or less expressed ochreous-yellow or orange streaks between veins, sometimes only slightly indicated, one along fold sometimes strong; a roundish dark fuscous blotch in disc before middle, and suboblique transverse blotch at $\frac{2}{3}$, these sometimes partially edged orange or in one specimen wholly orange; terminal edge orange: cilia white, basal third orange, limited by a dark fuscous shade sometimes obsolete. Hindwings dark fuscous; cilia grey, darker towards base.

Brazil, Parintins, in October; five specimens.

Trichotaphe cyanoneura, n. sp.

♂♀. 14–15 mm. Head whitish-ochreous. Palpi second joint pale violet, apex white, towards apex above with long rough yellow-ochreous hairs, terminal joint as long as second, white, anterior edge and a subbasal band deep violet. Thorax pale ochreous tinged ferruginous, patagia violet. Forewings rather narrow, termen rather obliquely rounded; dark chocolate-brown; costa and veins on costal area streaked deep violet-blue, extreme costal edge whitish; dorsal edge and veins towards dorsum less distinctly streaked violet-grey; median third from base to termen variably streaked or suffused light ochreous-yellowish, leaving darker oval spots of ground colour in disc before and beyond middle: cilia white, basal third light red-brownish, on costa greyish with dark grey basal shade. Hindwings rather dark grey; cilia light grey, darker towards base.

Brazil, Para, Obidos, July to September; British Guiana, Mallali, in March; eight specimens.

Trichotaphe retracta, n. sp.

♂♀. 13–14 mm. Head, thorax light grey, tips of scales pale greyish-ochreous. Palpi second joint dark grey speckled whitish, scales roughly triangularly expanded above towards apex, terminal joint whitish, anteriorly dark grey. Forewings elongate, costa slightly arched, apex obtuse, termen rather obliquely rounded; rather dark grey, more or less suffusedly irrorated whitish-ochreous; a blackish-fuscous flattened-triangular spot above fold towards base, and a rather oblique rhomboidal blotch in disc before middle united by a suffused streak along fold; two faint darker dots transversely placed on end of cell; a dark terminal fascia formed by absence of pale irroration, limited by an obscure pale line from $\frac{3}{4}$ of costa to dorsum before tornus, obtusely angulated near costa: cilia grey, a basal series of whitish-ochreous dots. Hindwings grey; cilia light grey.

Brazil, Obidos, in August and September; four specimens. Quite close to the North American *setosella*, but smaller, discal dots faint (always strong in *setosella*), and subterminal line as it approaches costa bent inwards, whereas in *setosella* it slopes outwards.

Trichotaphe fulvicilia, n. sp.

♂. 16–17 mm. Head ochreous-whitish tinged grey. Palpi second joint dark grey slightly speckled whitish, with long rough

projecting scales above towards and at apex, terminal joint white, anterior edge black. Antennal ciliations 2. Thorax whitish-ochreous more or less tinged grey dorsally. Forewings elongate, costa gently arched, apex obtuse, termen rounded, somewhat oblique; pale ochreous, thinly speckled dark brown; a rather broad ill-defined streak of dark brown suffusion beneath middle from base of dorsum to termen beneath apex; a slender suffused dark brown streak along costa from middle to near apex; a dark fuscous terminal interrupted line or series of dots: cilia light fulvous. Hindwings grey; cilia light grey.

Brazil, Manaos, in November; six specimens.

Trichotaphe formulata, n. sp.

♀. 18 mm. Head pale lilac-fuscous, face whitish-tinged. Palpi second joint dark fuscous, triangularly expanded above and at apex with long rough scales, apical edge whitish, terminal joint longer, whitish, anterior edge dark fuscous. Thorax fuscous. Forewings elongate-oblong, termen rather obliquely rounded; extreme costal edge ochreous-whitish from $\frac{1}{4}$ to $\frac{3}{4}$; a blackish dot on base of costa; stigmata small, dark fuscous, with adjacent whitish dots posteriorly, plical beneath first discal: cilia fuscous. Hindwings dark fuscous; cilia grey, a darker basal shade.

Brazil, Parintins, in October; two specimens.

Dichomeris plexigramma, n. sp.

♂♀. 18–20 mm. Head, thorax pale ochreous, sometimes sprinkled fuscous. Palpi second joint pale ochreous sprinkled dark fuscous, with loose rough expansible long hairscales above, beneath, and at apex, terminal joint shorter, ochreous-whitish, anterior edge dark fuscous. Forewings elongate, costa anteriorly gently arched, faintly sinuate beyond middle, apex obtuse, termen obliquely rounded; pale ochreous, variably streaked dark brown suffusion between veins, more strongly in disc and forming oblique wedge-shaped streaks in cell; sometimes a pale shade near and parallel to termen: cilia pale ochreous suffused brownish, round apex suffused dark brown. Hindwings dark grey; cilia grey.

Brazil, Obidos, Teffé; Peru, Iquitos; British Guiana, Bartica; French Guiana, R. Maroni; August to March, eight specimens.

Dichomeris thalpodes, n. sp.

♂♀. 12–13 mm. Head pale ochreous, sides suffused orange. Palpi orange, second joint with roughly expanded hairs towards apex above, terminal joint somewhat shorter, tip blackish. Thorax ferruginous-orange. Forewings elongate, costa anteriorly gently arched, then nearly straight, apex obtuse, termen rounded, somewhat oblique; orange, indistinctly and suffusedly streaked ferruginous on veins, broader streaks of deep ferruginous suffusion along dorsum and posterior $\frac{2}{3}$ of costa, some streaks of deep ferruginous suffusion in cell; rather irregular dark reddish-fuscous marginal dots round apex and termen: cilia orange variably mixed ferruginous. Hindwings dark grey; cilia grey, round apex suffused light ferruginous-ochreous.

Brazil, Para; Peru, R. Napo; May to July, four specimens.

Dichomeris stratigera, n. sp.

♂. 14 mm. Head whitish-ochreous slightly infuscated on crown, sides ferruginous. Palpi second joint long, yellow-ochreous, triangularly expanded above with ferruginous hairscales and with similar projecting scales at apex, terminal joint much shorter, whitish, anterior edge irregularly blackish. Thorax dorsally dark fuscous edged deep ferruginous, patagia lilac, shoulders ferruginous. Forewings rather narrow, costa gently arched, apex obtuse, termen very obliquely rounded; pale purplish-lilac, a streak of ochreous-yellow suffusion beneath costa from base to near middle; a dark fuscous streak occupying dorsal $\frac{2}{3}$ of wing throughout, its upper portion marked with a thick deep ferruginous streak from base to middle, where it forms a short triangular prominence upwards; second discal stigma ferruginous; a faint pale curved subterminal line edged ferruginous posteriorly: cilia pale ochreous suffusedly spotted ferruginous, tips pale grey on termen. Hindwings dark grey; cilia grey.

Brazil, Parintins, in October; one specimen.

Dichomeris prensans, n. sp.

♂♀. 12–13 mm. Head, thorax rather dark fuscous. Palpi second joint long, rather dark fuscous or brownish, somewhat whitish-speckled, above with long rough hairscales projecting roughly at apex, terminal joint shorter, whitish, with three obscure blackish-grey bands. Antennae ♂ with strong sinuate notch above basal

joint. Forewings rather narrow, costa slightly arched, apex obtuse, termen obliquely rounded; brownish-ochreous, often violet-tinged, sometimes obscurely strigulated ferruginous-brown; a streak of dark brown suffusion along costa from base to $\frac{5}{6}$; dorsal half suffused dark violet-brownish, variably mixed or strigulated dark ferruginous-fuscous, stigmata sometimes perceptible as ferruginous-brown spots, plical beyond first discal; a variable irregular narrow terminal fascia of dark brown suffusion: cilia ferruginous-ochreous, a darker subbasal interrupted line. Hindwings dark grey; cilia grey.

Brazil, Para, Parintins, Manaos; Peru, Iquitos; British Guiana, Bartica; July to March, twenty-six specimens. Very similar to *zomias*, but smaller and darker, and in that species the costa is not broadly suffused dark brown, and the antennae of male have no basal notch; when the stigmata are perceptible, the plical is before first discal, instead of beyond it.

Dichomeris acrolychna, n. sp.

♂♀. 9–11 mm. Head, thorax rather dark fuscous. Palpi second joint rather dark fuscous, pale-speckled, above with long rough hairscales projecting at apex, terminal joint whitish, anterior edge dark fuscous. Antennae ♂ with sinuate notch just above basal joint. Forewings rather narrow, costa slightly arched, apex obtuse, termen rounded, rather oblique; rather dark ashy-fuscous, obscurely whitish-speckled; stigmata dark fuscous or ferruginous-brown, plical somewhat beyond first discal; a curved dark ferruginous-brown subterminal shade sometimes perceptible: cilia grey, round apex and upper part of termen ferruginous-yellowish, with black basal line. Hindwings dark grey; cilia grey.

Brazil, Para, June, July; nine specimens. Allied to preceding.

Dichomeris thalamopa, n. sp.

♀. 10 mm. Head, thorax deep blue-purple. Palpi dark purple-fuscous, second joint with scales slightly expanded above near before whitish apex, terminal joint whitish except anterior edge and a basal band. Forewings elongate, costa gently arched, apex obtuse, termen obliquely rounded; glossy deep purple; a small orange mark surrounded with black towards costa near base; a slightly curved irregular black antemedian fascia edged each side with orange black-edged lines; apical area wholly blackish beyond an orange transverse line at $\frac{4}{5}$ making a strong rounded loop inwards

in disc, its costal edge whitish: cilia dark purplish-grey. Hindwings dark fuscous; cilia grey, a darker basal line.

Brazil, Teffé, in January; one specimen.

Dichomeris ptilocompa, n. sp.

♂♀. 9–11 mm. Head, thorax grey. Palpi second joint dark grey, in ♂ with very long expansible fringe of hairs above, in ♀ scales triangularly expanded towards apex, terminal joint whitish, anterior edge and a subbasal band dark fuscous. Antennae ♂ basal joint with large blackish apical scale-tuft. Forewings elongate, costa gently arched, apex obtuse, termen obliquely rounded; leaden-grey; a moderate slightly oblique blackish fascia before middle, not reaching costa, edged ochreous-yellow; a small round dark fuscous spot edged ochreous-yellow on end of cell, well separated from following fascia; a broad blackish fascia from $\frac{3}{4}$ of costa to tornus, anteriorly edged by a rather oblique ochreous-yellow line indented in middle; subconfluent triangular blackish marginal dots round apex and termen, separated anteriorly by ochreous-whitish or yellowish dots: cilia grey, a basal yellowish or ochreous-whitish shade round apex and upper part of termen. Hindwings dark grey; cilia grey, a darker subbasal shade.

Brazil, Teffé; Peru, Jurimaguas; December to March, seven specimens. Very like *sumptella*, but margins of markings yellower and discal spot well separated from posterior fascia; ♂ also immediately recognised by antennal tuft (not present in *sumptella*), and much longer hairs of palpi.

Dichomeris subdentata, n. sp.

♂. 10 mm. Head, thorax grey, face whitish-tinged. Palpi second joint dark grey, with very long expansible fringe of grey hairs above, terminal joint whitish, anterior edge and a subbasal band dark fuscous. Antennae basal joint with large blackish apical scale-tuft and acute horny tooth beneath this. Forewings elongate, costa gently arched, apex obtuse, termen obliquely rounded; leaden-grey; a triangular blackish finely white-edged blotch from dorsum before middle, nearly reaching costa; a round blackish finely white-edged spot in disc touching posterior fascia; a broad blackish fascia from $\frac{3}{4}$ of costa to tornus, edged anteriorly by a fine white hardly oblique line; an irregular blackish marginal line round apex and termen preceded by a white line: cilia grey,

base dotted white, a white patch on costa before apex. Hindwings dark grey; cilia grey, a darker subbasal line.

Brazil, Santarem, in August; one specimen. Allied to preceding, with similar antennal tuft, but horny tooth additional; markings edged white, not yellow, discal spot adjacent to fascia as in *sumptella*, pointed anterior blotch characteristic.

Dichomeris ellipsias, n. sp.

♂. 11 mm. Head, thorax grey. Palpi second joint dark fuscous, scales somewhat expanded above near apex, terminal joint rather shorter, whitish, anterior edge dark fuscous. Forewings elongate, costa gently arched, apex obtuse, termen rounded, rather oblique; rather dark grey; a rather oblique transverse elliptical blackish blotch at $\frac{1}{3}$, yellowish-edged, nearly reaching dorsum, not nearly reaching costa; a round blackish yellowish-edged spot in disc before $\frac{2}{3}$; a moderately broad blackish fascia from $\frac{3}{4}$ of costa to tornus, anteriorly edged by a yellow-ochreous line indented in middle; triangular blackish marginal dots round apex and termen, separated anteriorly with ochreous-whitish: cilia light grey mixed whitish-ochreous. Hindwings dark grey; cilia grey, a darker basal line.

Peru, Iquitos, in May; one specimen.

Dichomeris thesmiopa, n. sp.

♂. 12 mm. Head, thorax grey, an ochreous-whitish stripe on patagia. Palpi second joint grey, strongly thickened with dense projecting scales above, anterior edge ochreous-whitish, terminal joint whitish, a dark fuscous line on each side, inner interrupted. Anal tuft pale yellow-ochreous. Forewings elongate, slightly dilated, costa gently arched, apex obtuse, termen rounded, somewhat oblique; violet-grey; a transverse-oval blackish blotch, finely edged white, resting on middle of dorsum and reaching $\frac{3}{4}$ across wing, anterior edge prominent in middle, lower part of blotch occupied except margins by a light grey irregular spot; a large black finely white-edged dot in disc at $\frac{2}{5}$; a fine slightly curved line of whitish irroration from a wedgeshaped white mark on costa at $\frac{4}{5}$ to dorsum before tornus; a marginal series of white dots edged blackish terminally round posterior part of costa and termen: cilia grey. Hindwings rather dark grey; cilia grey.

Brazil, Obidos, in September; one specimen.

Dichomeris procyphodes, n. sp.

♂♀. 15–16 mm. Head, thorax rather dark fuscous, face whitish-suffused. Palpi second joint rather dark brownish, triangularly expanded with rough scales above projecting round apex, terminal joint whitish, anterior edge and a basal band dark fuscous. Forewings elongate, on anterior half much wider and with costa rather strongly arched, posteriorly narrowed and with costa slightly sinuate, apex rounded, termen rounded, somewhat oblique; rather dark purple, paler towards costa anteriorly; a dorsal streak of dark ferruginous-brown suffusion from near base to beyond middle; an oblique rather dark brown streak in middle of disc; a dark ferruginous-brown costal streak from $\frac{2}{3}$ to apex, attenuated anteriorly, on posterior half suffused beneath and with extreme costal edge whitish, anteriorly better defined by a streak of whitish-grey-ochreous suffusion; an indistinct small dark brownish spot on end of cell, wing beyond this irregularly suffused brownish; a faint pale curved dentate subterminal line, edged posteriorly darker suffusion; a dark ferruginous-fuscous marginal line round apex and termen: cilia short, whitish, barred fuscous. Hindwings grey, darker posteriorly; cilia whitish-grey, a darker subbasal shade.

Brazil, Parintins, in October; two specimens.

Dichomeris miltophragma, n. sp.

♂♀. 13–16 mm. Head grey, sides suffused ferruginous. Palpi ferruginous, second joint with expansion of scales above near apex, terminal joint as long as second, tip whitish, a dark fuscous subapical band. Thorax grey, shoulders narrowly ferruginous. Forewings broader anteriorly and with costa strongly arched from base to beyond middle, then narrower with costa nearly straight, apex rounded-obtuse, termen rounded, little oblique; leaden-grey; three oblique vermillion-red blotches edged dark brown-red and then whitish, first on base of dorsum, second from beneath costa at $\frac{1}{4}$ to near middle of dorsum, third traversing disc at $\frac{2}{3}$; an irregular-edged ferruginous line margined pale ochreous running round posterior $\frac{2}{5}$ of costa and termen: cilia ferruginous. Hindwings dark grey; cilia grey, a darker basal shade.

Brazil, Para, Obidos, Parintins, July to October; Peru, Jurimaguas, in March; seven specimens.

Lioclepta, n. g.

Head smooth, sidetufts slightly raised; ocelli posterior; tongue developed. Antennae $\frac{5}{6}$, in ♂ stout, simple, basal joint elongate,

without pecten. Labial palpi moderately long, recurved, second joint with scales roughly tufted at apex beneath, terminal joint somewhat shorter than second, slender, pointed. Maxillary palpi very short, filiform, appressed to tongue. Posterior tibiae clothed with long rough hairs above. Forewings 1*b* short-furcate, 2 from towards angle, 7 to costa, 8 and 9 out of 7, 11 from beyond middle. Hindwings somewhat under 1, trapezoidal, termen slightly sinuate, cilia $\frac{3}{4}$; 3 and 4 stalked, 5 absent, 6 and 7 stalked.

Intermediate between *Thrypsigenes* and *Deoclona*; these genera probably belong to the *Lecithocera* group.

Lioclepta complanata, n. sp.

♂♀. 13–14 mm. Head, thorax whitish-ochreous. Palpi ochreous-whitish, second joint minutely grey-speckled except apex. Forewings elongate, costa gently arched, apex obtuse-pointed, termen slightly rounded, rather strongly oblique; pale ochreous or whitish-ochreous, greyish-sprinkled, costa sometimes yellower posteriorly: cilia whitish-ochreous. Hindwings whitish-yellowish; cilia yellow-whitish.

Peru, Jurimaguas, in March; two specimens.

Athrinacia cosmophragma, n. sp.

♂♀. 9–10 mm. Head grey, sides ochreous-whitish. Palpi ochreous-whitish. Thorax grey, more or less developed ochreous-whitish stripes on sides of back and shoulders. Antennae 1. Forewings elongate, costa slightly arched, apex obtuse, termen obliquely rounded; 11 from $\frac{4}{5}$ of cell; lilac-grey; markings strongly outlined pale yellow edged blackish, and filled in with ground colour speckled blackish; a slightly curved elongate-oval blotch extending from base just beneath costa to $\frac{1}{3}$ of dorsum; transverse fasciae slightly before middle and at $\frac{2}{3}$ (yellow-margined all round); a narrow pale yellowish fascia, inwards-angulated in middle, from costa towards apex to tornus; some blackish marginal marks round apex and termen surrounded with pale yellowish: cilia light lilac-grey. Hindwings grey; cilia light grey.

Brazil, Para, June, July; six specimens. This is certainly referable to *Athrinacia* Wals., of which it possesses the characteristic neuration and facies; in the typical species, however (which I have not seen), the antennae are described as $\frac{1}{5}$, and vein 11 is figured as rising from the middle. The genus is probably related to the *Lecithocera* group.

IV. *Notes on the Orthoptera in the British Museum. 2. The group of* Calliptamini.* By B. P. Uvarov, F.E.S.

[Read December 7th, 1921.]

Plate I.

The re-arranging of the group *Calliptamini* of the British Museum collection proved to be a very difficult task, because the only revision of this group,† though a comparatively recent one, is in many respects unsatisfactory, the whole system adopted in it being based on purely superficial characters, while a number of species are left out. A more detailed study of morphological characters and especially of the structure of the external genitalia enabled me to clear up, to a certain extent, the generic classification of the group and to establish a system which seems to be more or less natural. As this my work, however, is nothing more than an annotated list of species contained in the British Museum, and by no means a revision of the group, I did not try to study all the types in other Museums, and have left many questions, not definitely settled, for the future monographer of this extremely interesting group.

Besides the British Museum materials, I included in this paper also some species from the Hope Department, University Museum, Oxford; I am much obliged to Prof. E. B. Poulton for the loan of the specimens.

KEY TO THE GENERA.

1. (17) Supra-anal plate of the male elongato-triangulare, much longer than broad. Male cerci horizontal, much longer than the supra-anal plate, strongly laminato-compressed, incurved, with a rounded apical lobe and 1–2 small teeth below it.

* See Trans. Ent. Soc. London, 1921, pp. 106–144.

† Revision y estudio del grupo *Calopteni*, par A. Martinez y Fernandez.—Anales Soc. Esp. Hist. Nat., xxx, pp. 253–309; 1902.

2. (3) Pronotum strongly constricted before the middle, with the lateral keels angulato-inflexed. . . . *Acorypha* Krauss.
3. (2) Pronotum without any constriction before the middle, with the lateral keels (when developed) more or less parallel and straight or convex.
5. (6) Body strongly depressed and coarsely rugose. Fastigium of vertex very broad, flat. Pronotum with the metazona much longer than the prozona, and the hind angle long. Prosternal tubercle in the shape of a transverse lamina, truncate at the apex. Hind femora enormously dilated, with the upper outer field strongly granose, and the upper carina strongly serrate. Male cerci with one subapical tooth. . . . . *Brachyxenia* Kirby.
6. (5) Body distinctly compressed laterally, smooth or scarcely rugose. Fastigium of the vertex narrow, more or less impressed. Pronotum with the metazona subequal to the prozona, or even shorter; its hind angle not elongate. Prosternal tubercle not laminate.
7. (14) Elytra and wings developed or only shortened.
8. (13) Male cerci with only one subapical tooth.
9. (10) Pronotum with the disc convex, lateral keels obliterate and the middle keel scarcely perceptible. Hind femora very broad and short. . . . . *Sphodromerus* Stål.
10. (9) Pronotum with the disc practically flat, the middle keel distinct and the lateral keels more or less distinct.
11. (12) Lateral keels of the pronotum irregular, feebly divergent backwards. Hind femora distinctly dilated. Hind tibiae with inner spurs subequal. . . . . *Kripa* Kirby.
12. (11) Lateral keels of pronotum straight, distinctly, or even strongly divergent backwards. Hind femora not more dilated than it is normal for the group. Hind tibiae with the lower inner spur much longer than the upper one. *Caloptenopsis* Bal.
13. (8) Male cerci with two subapical teeth. Disc of the pronotum practically flat, all three keels distinct, the lateral ones straight, somewhat divergent backwards. Inner spurs of the hind tibiae subequal to each other. . *Calliptamus* Serv.
14. (7) Elytra lateral, wings not developed.
15. (16) Frontal ridge flat. Pronotum very obtusely emarginate behind. . . . . *Paracaloptenus* Bol.
16. (15) Frontal ridge sulcate. Pronotum obtusangulate behind. *Peripolus* M. Fern.
17. (1) Supra-anal plate of the male broad, transverse, or scarcely longer than broad; its hind margin truncate, or rotundato-

truncate with a small projection in the middle. Male cerci oblique, or vertical, of very different shape, but never armed with a tooth near the apex.

18. (41) Pronotum not constricted before the middle, with the median keel not or moderately elevated.
19. (40) Median keel of the pronotum distinct; lateral keels more or less distinct.
20. (39) Male cerci oblique or vertical, hook-shaped, or recurved or foliaceous, always many times as long as broad, never denticulate on the lower margin.
21. (38) Elytra and wings developed, or simply shortened; male cerci not foliaceous.
22. (33) Male cerci vertical, hook-shaped.
23. (28) Male supra-anal plate with a transverse row of four chitinous tubercles about its middle.
24. (27) Hind femora strongly incrassate, especially in the male; their lower carina practically straight from the base up to beyond the middle, where it is obtusangularly bent. Hind tibiae in the male distinctly curved. Prosternal tubercle conical or narrowed towards the obtuse apex.
25. (26) Elytra and wings shortened; the wings coloured. Male cerci compressed laterally and dilated towards the apex. *Amblyphymus*, gen. nov.
26. (25) Elytra and wings fully developed; the wings not coloured. Male cerci not compressed laterally and slightly thickened at the apex. . . . . *Rhachitopis*, gen. nov.
27. (24) Hind femora not incrassate, even in the male; their lower carina regularly convex. Hind tibiae in the male straight. Prosternal tubercle widened towards the emarginate apex. Male cerci not compressed laterally. Pronotum with at least one pair of small round tubercles between the transverse sulci. . . . . *Platyphymus* gen. nov.
28. (23) Male supra-anal plate with only a pair of submedian tubercles.
29. (32) Lateral keels of the pronotum straight or practically so, with the transverse sulci, cutting them, very fine. Hind angle of the pronotum obtuse, its sides not emarginate. Prosternal tubercle with the apex truncate, or emarginate.
30. (31) Male cerci compressed laterally, with the apex obliquely truncate. Male supra-anal plate transverse, with the sides bisinuate and the hind angles attenuate. Wings faintly coloured. . . . . *Calliptamicus* gen. nov.
31. (30) Male cerci not compressed laterally, with the apex obtusely conical, thickened basally. Male supra-anal plate quad-

rangular, with the sides and hind angles perfectly straight. Wings hyaline. . . . . *Platacanthoides* Kirby.

32. (29) Lateral keels of the pronotum deeply cut by the transverse sulci and, therefore, sinuate. Hind angle of the pronotum attenuate, sharp, with the sides emarginate. Prosternal tubercle with the apex obtusely rounded.
Martinczius, gen. nov.

33. (22) Male cerci oblique, recurved, but not hook-shaped.

34. (35) Smooth. Median keel of pronotum linear, in profile straight, scarcely cut by the transverse sulci. Lateral keels linear, practically straight, not sinuate. Supra-anal plate of the male without chitinous tubercles or with but a pair of scarcely distinct submedian tubercles. Prosternal tubercle obtusely conical. *Calliptamulus*, gen. nov.

35. (34) Strongly rugulose and tuberculate (reminding some members of *Oedipodini*). Median keel of pronotum raised, in profile crested, deeply dissected by the transverse sulci. Lateral keels strongly sinuate, or interrupted.

36. (37) Prosternal tubercle conical. Lateral keels of pronotum deeply cut by the transverse sulci and sinuate, but complete. Supra-anal plate of the male with a pair of submedian carinulae, instead of tubercles.
Brachyphymus, gen. nov.

37. (36) Prosternal tubercle quadrate, truncate at the apex. Lateral keels of pronotum in the shape of a row of interrupted carinulae and tubercles. Supra-anal plate of the male with two submedian tubercles. . . . *Euryphymus* Stål.

38. (21) Elytra lateral; their pre-radial field strongly dilated and emarginate behind. Wings not developed. Male cerci foliaceous. Prosternal tubercle with the apex pointed, attenuate. . . . . *Acrophymus*, gen. nov.

39. (20) Male cerci oblique, about twice as long as broad, elongato-triangular, hollowed out from the inner side, with the lower margin bearing several teeth. Supra-anal plate of the male rounded with a pair of fairly large tubercles at the outer basal angles and a row of four tubercles about the middle. Prosternal tubercle truncate.
Aneuryphymus, gen. nov.

40. (19) Median keel of the pronotum very feeble; lateral keels obliterate. Head and pronotum strongly rugose. Wings coloured. . . . . *Plegmapterus* M. Fern.

41. (18) Pronotum constricted before the middle and strongly compressed laterally; median keel very high, tectiform, bidentate in prozona, convex in metazona. Lateral keels

faintly indicated in the metazona only. Wings coloured basally and strongly infumate in the rest. Prosternal tubercle thick, obtuse. . . . . *Pachyphymus*, gen. nov.

The genus *Acoryphella*, Giglio-Tos (with two species in it, *A. zonata* G.-T. and *A. punctata* G.-T.) is not included in the key, as it has been described by the female sex only, and its exact relationship is impossible to determine without studying the types.

Genus Brachyxenia Kirby.

1914. *Brachyxenia* Kirby, Fauna Brit. India, Acrid., pp. 195, 256.

This curious genus reminds us in its habitus of an *Eremobiin* rather than of a member of *Calliptamini*; but the structure of the prosternum and especially that of the male cerci, which are of the same type as in *Caloptenopsis*, leaves no doubt as to its proper systematic position.

1. Brachyxenia scutifera (Walk.).

1870. *Caloptenus scutifer* Walker, Cat. Derm. Salt. B. M., iv, pp. 701, 704, no. 56.
1910. *C*[*alliptamus*] (??) *scutifer* Kirby, Syn. Cat. Orth., iii, p. 553, no. 7.
1914. *Brachyxenia scutifera* Kirby, Fauna Brit. India, Acrid., p. 256, no. 315, fig. 136.

British Museum specimens: S. Hindostan, 1 ♀ (*Walker's type*); S. India, 1 ♀. In the Hope Museum, Oxford, I have seen 1 ♂ and 1 ♀ of this species from Madras.

Genus Sphodromerus Stal.

This genus is as yet very badly known, and a revision of its species appears not to be possible until more material were studied. The majority of the known species are described by their coloration only, and one may presume that the coloration in this genus is as inconstant as it is in *Calliptamus*. The genus is confined to the Eremian subregion of the Palaearctic region, and the number of undescribed species is, probably, not a small one.

1. **Sphodromerus serapis** (Serv.).

1839. *Calliptamus serapis* Serville, Ins. Orth., p. 689, no. 2.
1870. *Caloptenus scriptipennis* Walker, Cat. Derm. Salt. B. M., iv, p. 686, no. 24.
? 1893. *Caloptenus sacer* Giglio-Tos, Boll. Mus. Torino, viii (164), p. 10, no. 52, fig. 1.
1902. *S[phodromerus] serapis* Jacobson and Bianchi, Orth. and Pseudon. Russ. Emp., pp. 204, 316.
1902. *S[phodromerus serapis]* M. Fernandez, An. Soc. Esp. Hist. Nat., xxx, p. 280.
1910. *S[phodromerus] serapis* Kirby, Syn. Cat. Orth., iii, p. 548, no. 1.
1910. *S[phodromerus] sacer* Kirby, l.c., p. 549, no. 2.

Though the type of *C. scriptipennis* is lost, its description leaves no doubt that it is conspecific with *C. serapis*, as is, also, probably *C. sacer*.

C. serapis seems to be a rather widely distributed species, occurring all over the Eremian subregion, from Algeria to Transcaspia (cf. Uvarov, Horae Soc. Ent. Ross., xl, no. 3, 1912, p. 31).

British Museum specimen: "Midian," 1 ♀.

2. **Sphodromerus pilipes** (Jans.).

1891. *Caloptenus pilipes* Janson, Hart, Fauna and Flora of Sinai, pp. 183, 185, fig. 4.
1910. *S[phodromerus] pilipes* Kirby, Syn. Cat. Orth., iii, p. 549, no. 9.

This species is scarcely distinct, save by the coloration, from *C. serapis*, but I prefer to keep it separately until further materials will be studied.

British Museum specimen: Ghôr-es-Safiah, Palestine (*Janson's type*).

3. **Sphodromerus decoloratus** (?) Finot.

1894. *Sphodromerus decoloratus* Finot, Bull. Soc. Ent. France, lxiii, p. xiii, no. 3.
1896. *Sphodromerus decoloratus* Finot, Ann. Soc. Ent. France, xliv, p. 548.
1910. *S[phodromerus] decoloratus* Kirby, Syn. Cat. Orth., iii, p. 549, no. 4.

This species, again, is very close to *S. serapis* and may be conspecific with it. The only specimen in the British Museum collection is somewhat smaller than it is given in the original description, and I am, therefore, not quite sure in my identification.

British Museum specimen: Biskra, Algeria, 7 ii. 1895, 1 ♀.

4. **Sphodromerus sanguiniferus** Rehn.

1901. *Sphodromerus sanguiniferus*, Proc. Acad. Nat. Scien. Philad., liii, p. 379.
1910. *S*[*phodromerus*] *sanguiniferus* Kirby, Syn. Cat. Orth., iii, p. 549, no. 7.

Though Rehn does not mention in his description the coloration of the wings, I do not doubt that two females before me, which have the wings rose with the veins in the fore part brown, belong to his species. Dimensions of the female, which has not been known hitherto, are as follows :—

Length of body	29 mm.
,, ,, pronotum	9
,, ,, hind femur	18·5
,, ,, elytra	12·5

British Museum specimens: Somaliland (*J. W. Bury*), 1 ♀; Somali (*Miss P. Gillet*), 1 ♀.

To the genus *Sphodromerus* belong also the following three species, known to me by their descriptions only :—

5. **Sphodromerus cruentatus** Krauss.

1902. *S*[*phodromerus*] *cruentatus* Krauss, Verh. zool.-bot. Ges. Wien, lii, p. 247, no. 28.
1910. *S*[*phodromerus*] *cruentatus* Kirby, Syn. Cat. Orth., iii, p. 549, no. 5.
Described from Oued Nsa, Algerian Sahara.

6. **Sphodromerus inconspicuus** Schult.

1894. *Sph*[*odromerus*] *inconspicuus* Schulthess-Rechberg, Zool. Jahrb., Syst., viii, p. 78.
1910. *S*[*phodromerus*] *inconspicuus* Kirby, Syn. Cat. Orth., iii, p. 549, no. 6.

I am not quite sure whether this species is not identical with *S. sanguiniferus*, Rehn, both having been described from Somaliland.

7. Sphodromerus pantherinus Krauss.

1902. *Sphodromerus pantherinus* Krauss, Anz. Akad. Wiss. Wien, no. vii, p. 3.
1907. *Sph[odromerus] pantherinus* Krauss, Denkschr. Mat.-Nat. Kl. K. Akad. Wiss. Wien, lxxi, p. 13 (of separate copy), no. 19, pl. i, fig. 8.

This species, described from Makalla, S. Arabia, is omitted in Kirby's Catalogue.

Genus Kripa Kirby.

1914. *Kripa* Kirby, Fauna Brit. India, Acrid., pp. 195, 257.

This genus, as yet very insufficiently known, seems to be most closely related to *Sphodromerus*, the principal difference between these two genera being in the grade of development of the lateral pronotal carinae, which in *Kripa* are well indicated, though punctured and irregular, while in *Sphodromerus* they are not all or but scarcely perceptible, and the pronotum is, therefore, rounded. Some other distinctive features may be, also, looked for in the male external genitalia, but unfortunately, the male of the type species of *Kripa* (that is, *K. undulata* Kirby) is unknown, and, on the other hand, I have no males of any *Sphodromerus* before me. In its habitus *Kripa* is very like *Calliptamus*, owing to the developed pronotal keels and to the hind femora less dilated than in *Sphodromerus*. It differs from *Calliptamus*, however, by the irregular pronotal keels and also (if I am correct in placing *C. coelesyriensis* in *Kripa*) by the structure of the male cerci, which in *Calliptamus* are armed with two subapical teeth, while in *Kripa* by one only, as is the case also with *Caloptenopsis* and *Brachyxenia*.

I refer to the genus *Kripa*, which seems to be peculiar to the deserts of S.W. Asia, besides the genotype, also *Caloptenus coelesyriensis*, Gig.-Tos; it is possible that some of Walker's species described from Sinai and Arabia, and the types of which are lost, belongs also here; *Cal-*

liptamus bimaculatus, Krauss (Anz. Akad. Wiss. Wien, 1902, no. 7, p. 4) from Sokotra is also likely to be a *Kripa*.

1. **Kripa undulata** Kirby.

1914. *Kripa undulata* Kirby, Fauna Brit. India, Acrid., p. 257, no. 316, fig. 137.

British Museum specimen: Campbellpur, Punjab, 1 ♀ (*Kirby's type*).

2. **Kripa coelesyriensis** (Gig.-Tos.).

(Plate I, fig. 2.)

1893. *Caloptenus coelesyriensis* Giglio-Tos, Boll. Mus. Torino, viii (164), p. 10, no. 51, fig. 4.
1902. *C*[*aloptenus*] *coelesiriensis* M. Fernandez, Anal. Soc. Esp. Hist. Nat., xxx, p. 296.
1902. *C*[*alliptamus*] *coelosyriensis* Jacobson and Bianchi, Orth. Pseudon. Russ. Empire, pp. 205, 317.
1910. *S*[*phodromerus*] *coelesyriensis* Kirby, Syn. Cat. Orth., iii, p. 549, no. 3.
1914. *Calliptamus italicus* L. ab. *carbonaria*, Uvarov, Rev. Russe d'Entom, xiv, p. 226.
1921. *Sphodromerus coelosyriensis* Uvarov, Journ. Bombay Nat. Hist. Soc., xxviii (in print).

Both my description of *carbonaria* and the original one of *coelesyriensis* are based upon very dark, almost black coloured specimens, which is, however, not a specific character, since I had the opportunity of studying long series of specimens from Ordubad, Transcaucasia (in the Caucasian Museum, Tiflis), as well as of making observations on living insects at the same locality. The general coloration of insect varies from pitch-black to ochraceous, and the specimens of the latter coloration are very much like *K. undulata*. I should even not hesitate to regard *K. undulata* as conspecific with *K. coelesyriensis*, but the material on both species now before me is too scanty to draw a definite conclusion from it, and I should not like to rely on memory. The only character separating ochraceous coloured specimens of *K. coelesyriensis* from *K. undulata* is, as far as I can recollect, the coloration of hind tibiae, which are bright red in *undulata* and sanguineous in the other species.

K. coelesyriensis is known to occur in Syria, Mesopotamia, Persia and Ferghana in Turkestan; its occurrence in the northern parts of Punjab, whence *K. undulata* is known, would be only quite natural, which speaks in favour of the identity of both species.

British Museum specimen: 40 miles around Aleppo, Syria, iv–vii. 1919 (*F. G. Aldous*).

Genus Caloptenopsis I. Bol.

The identification of species of this genus is very difficult and uncertain, since the majority of species have been based on the colour characters which, in my opinion, are of but very little use in the whole group *Calliptamini*. At the same time, the study of certain species, represented by more or less extensive series of specimens, enables me to state definitely that they are not less variable (not in coloration only, but in certain morphological features, as well), than the *C. italicus* is. In some cases it is quite possible to ascertain the conspecifity of two or three "different" species by descriptions even, while often the descriptions are so insufficient that the species in question is simply unrecognisable without a study of the type. As I do not consider this paper as a complete revision of the group, I did not attempt a study of the types of all described species; but even going by descriptions I am able to reduce the number of species by a not inconsiderable figure, and I am sure that further studies, based on types and on long series of specimens, will result in a still more appreciable reduction in the number of species, while only few new ones may be also expected.

1. Caloptenopsis insignis (Walk.).

1870. *Caloptenus insignis* Walker, Cat. Derm. Salt. B. M., iv, p. 701, no. 52.
1870. *Caloptenus clarus* Walker, l.c., p. 711, no. 70.
1871. *Caloptenus spissus* Walker, l.c., v, Suppl., p. 70.
1898. *Caloptenopsis saussurei* M. Fernandez, Act. Soc. Esp. Hist. Nat., ser. ii, v, p. 11.
1902. *C[aloptenopsis] saussurei* M. Fernandez, Ann. Soc. Esp. Hist. Nat., xxx, pp. 282, 290.
1910. *C[aloptenopsis] insignis* Kirby, Syn. Cat. Orth., iii, p. 551, no. 18.
1910. *C[aloptenopsis] clarus* Kirby, l.c., p. 551, no. 20.

1914. *Caloptenopsis insignis* Kirby, Fauna Brit. India, Acr., p. 258, no. 317.
1918. *Caloptenopsis saussurei* I. Bolivar, Rev. R. Acad., Cien. Madrid, xvi, p. 409, no. 99.

The above synonymy has been established by me by the comparison of the actual types of three of Walker's species with a specimen in the British Museum received from Saussure under the manuscript name *Caloptenus femoratus* Sauss.; as M. Fernandez described his *C. saussurei* from the specimen also received from Saussure as *C. femoratus* Sauss., the identity of *C. insignis-clarus-spissus* with *C. saussurei* is beyond any doubt.

British Museum specimens: Hindostan (?), 1 ♀ (*Walker's type of C. insignis*); without locality, 2 ♀♀ (*Walker's types of C. clarus and C. spissus*; Walker records them in his descriptions as males, which is wrong); "Indes orient.," 1 ♀ (*labelled by Saussure as C. femoratus Sauss.*); 4 ♀♀ from India, without more precise labels (*Maxwell-Lefroy*).

2. **Caloptenopsis glaucopsis** (Walk.).

1870. *Caloptenus glaucopsis* Walker, Cat. Derm. Salt. B. M., iv, p. 702, no. 53.
1870. *Caloptenus liturifer* Walker, l.c., p. 703, no. 54.
1898. *Caloptenopsis crassiusculus* M. Fernandez, Act. Soc. Esp. Hist. Nat., ser. ii, v, p. 11.
1902. *C*[*aloptenopsis*] *crassiusculus* I. Bolivar, Ann. Soc. Ent. Fr., lxx, p. 628, pl. 9, fig. 38.
1902. *C*[*aloptenopsis*] *crassiusculus* M. Fernandez, Ann. Soc. Esp. Hist. Nat., xxx, pp. 282, 284–286.
1910. *E*[*uryphymus*] *glaucopsis* Kirby, Syn. Cat. Orth., iii, p. 547, no. 28.
1910. *C*[*aloptenopsis*] *liturifer* Kirby, l.c., p. 551, no. 17.
1910. *C*[*aloptenopsis*] *crassiusculus* Kirby, l.c., p. 551, no. 19.
1914. *Caloptenopsis glaucopis* (*sic*!) Kirby, Fauna Brit. India, Acr., pp. 258, 259, no. 318.
1914. *Caloptenopsis liturifer* Kirby, l.c., pp. 258, 259, no. 319.
1918. *Caloptenopsis glaucopsis* I. Bolivar, Rev. R. Acad. Cien., xvi, pp. 409, 410, no. 100.
1918. *Caloptenopsis liturifer* I. Bolivar, l.c., p. 410, no. 101.

The synonymy of the two of Walker's species is obvious when the types are compared; all further synonyms are also beyond doubt and their origin is due entirely to the fact that descriptions were made without any comparison with previously known species, as well as to the variability of the species, which is not quite constant in its characters, though in a far less degree than *C. italicus* is.

British Museum specimens: North Hindostan, 1 ♀ (*Walker's type of C. glaucopsis*); South Hindostan, 2 ♀♀ (*Walker's types of C. liturifer*); Baltistan, 2 ♂♂, 5 ♀♀; Ahmednajarbet, India, 1 ♀; Karachi, 1 ♀; Koilpati, Madras, 20 vii. 1907, 1 ♂; Africa (*Dr. F. Ostwald*), 1 ♂, 1 ♀.

3. Caloptenopsis pallidicornis (Stal.).

1876. *C*[*alliptenus*] *pallidicornis* Stal, Öfv. Vet. Akad. Förhand., xxxiii, 3, p. 43, no. 1.
1902. *C*[*aloptenopsis*] *pallidicornis* M. Fernandez, Ann. Soc. Esp. Hist. Nat., xxx, pp. 282, 286.
1902. *Caloptenopsis fratercula* Kirby, Trans. Ent. Soc. Lond., p. 111, no. 120.
1902. *Caloptenopsis uniformis* Kirby, l.c., p. 112, no. 121.
1910. *C*[*aloptenopsis*] *fratercula* Kirby, Syn. Cat. Orth., iii, p. 550, no. 5.
1910. *C*[*aloptenopsis*] *uniformis* Kirby, l.c., p. 550, no. 6.

This is a species which seems to be pretty constant in its size and morphological characters, though rather variable in the coloration. Both Kirby's species represent mere colour forms.

British Museum specimens: Cape Colony (*Miss J. Brincker*), 1 ♀; Pretoria (*W. L. Distant*), numerous specimens of both sexes (*Kirby's types of C. uniformis and C. fratercula*); Salisbury, Mashonaland (*G. A. K. Marshall*), 3 ♂♂, 4 ♀♀; Nyasaland, 1 ♀; N. Johnston, 1 ♀; Brit. Centr. Africa (*A. R. Andrew*), 1 ♀.

C. pallidicornis is confined in its distribution to South Africa.

4. Caloptenopsis meruensis (Sjöst.).

1909. *Calliptamus meruensis*, Sjöstedt, Wiss. Erg. Kilim.-Meru Exped., 17. Orth., 7. Acrid., pp. 185, 192, pl. 7, fig. 16.

This species is very much alike in its habitus to *C. palli-*

dicornis Stål, but easily separated from it by the broader fastigium of the vertex, as well as by the coloration of wings and hind femora.

British Museum specimens: East of Victoria Nyanza, Africa (*Dr. F. Ostwald*), 1 ♂, 1 ♀ (taken *in copûla*).

5. Caloptenopsis unicarinatus (Krauss).

1877. *C*[*aloptenus*] *unicarinatus* Krauss, Sitzb. Akad. Wiss. Wien., lxxvi (1), p. 37, no. 1.
1893. *Euryphymus marginipennis* Karsch, Berl. Ent. Ztschr., xxxviii, pp. 103, 104, no. 71.
1902. *Euryphymus marginipennis* M. Fernandez, An. Soc. Esp. Hist. Nat., pp. 306, 307.
1902. [*Caloptenopsis*?] *marginipennis* M. Fernandez, l.c., p. 308, no. 15.
1910. *E*[*uryphymus*] *unicarinatus* Kirby, Syn. Cat. Orth., iii, p. 547, no. 19.
1910. *E*[*uryphymus*] *marginipennis* Kirby, l.c., p. 547, no. 24.

The species is easily recognised by the lateral carinae almost obliterate, punctured throughout, even in the prozona.

British Museum specimens: Amantin, Ashanti, Gold Coast (*J. J. Simpson*), 1 ♂; Sonkonia, Sierra Leone (*J. J. Simpson*), 1 ♂.

6. Caloptenopsis mossambicus (Brancs.).

1893. *Caloptenus mossambicus* Brancsik, Jahresh. Naturviss. Ver. Trencs. Comit., xv–xvi, p. 194, pl. xii, fig. 4.
1896. *Caloptenopsis angusticosta* Karsch, Stett. Ent. Zeit. lvii, p. 321, no. 86, fig. 37.
1902. *C*[*aloptenopsis*] *mossambicus* M. Fernandez, An. Soc. Esp. Hist. Nat., xxx, pp. 282, 288.
1902. *C*[*aloptenopsis*] *angusticosta* M. Fernandez, l.c., pp. 282, 293.
1902. *Calliptamus tibialis* Kirby, Trans. Ent. Soc. Lond., p. 110, no. 119.
1909. *Caloptenopsis speciosa* Sjöstedt, Wiss. Erg. Kilim.-Meru Exped., 17. Orth., 7. Acrid., pp. 185, 193, pl. 7, fig. 17.

1910. *C*[*aloptenopsis*] *tibialis* Kirby, Syn. Cat. Orth., iii, p. 550, no. 7 (*syn. excl.* !).
1910. *C*[*aloptenopsis*] *mossambicus* Kirby, l.c., p. 550, no. 10.
1910. *C*[*aloptenopsis*] *angusticosta* Kirby, l.c., p. 550, no. 13.

Though the above synonymy is based almost entirely on the descriptions, as I had no types before me besides the species described by Kirby, I feel quite sure that it is correct, and the different "species" represent only colour forms. There are two principal forms, corresponding to those of *Calliptamus italicus* L. : the one is rather pale, spotted with grey, and the other is much darker, with very distinct pale lateral longitudinal fasciae on the upperside (*angusticosta* Karsch, which corresponds to *C. italicus* var. *marginellus* Serv.). The hind tibiae in the spotted form are red or yellowish, in the fasciate form they are wax-yellow.

British Museum specimens : Pretoria (*W. L. Distant*), 6 ♀♀, 1 ♂; Africa (*W. L. Distant*), 1 ♀; Pemba Island, 1 ♀; Warm Baths, Waterberg, 1 ♀; Zomba, Brit. Centr. Afr. (*P. Rendall*), 1 ♀; Zomba, Feb.-March 1896 (*A. Whyte*) (*all these are Kirby's types of C. tibialis*); Salisbury, Mashonaland (*G. A. K. Marshall*), 1 ♀; Mt. Chirinda, Gazaland (*G. A. K. Marshall*), 2 ♂♂, 1 ♀; Zimbiti, E. Africa (*P. A. Sheppard*), 1 ♂, 1 ♀.

7. Caloptenopsis ferrifer (Walk.).

1870. *Caloptenus ferrifer* Walker, Cat. Derm. Salt. B. M., iv, pp. 690, 698, no. 46.
1889. *C*[*aloptenus*] *nigrovariegatus* I. Bolivar, Jorn. Sci. Lisboa, seg. ser., i, p. 171, no. 174.
1896. *Caloptenopsis laticosta* Karsch, Stett. Ent. Zeit., lvii, p. 322, no. 87.
1902. *C*[*aloptenopsis*] *nigrovariegatus* M. Fernandez, An. Soc. Esp. Hist. Natur., xxx, pp. 282, 289.
1902. *C*[*aloptenopsis*] *laticosta* M. Fernandez, l.c., pp. 282, 294.
1902. *Caloptenopsis johnstoni* Kirby, Proc. Zool. Soc. London, p. 101, no 23.
1909. *Caloptenopsis laticosta* Sjöstedt, Wiss. Erg. Kilim.-Meru Exped., 17. Orth., 7. Acrid., pp. 185, 194.
1910. *C*[*aloptenopsis*] *ferrifer* Kirby, Syn. Cat. Orth., iii, p. 549, no. 4 (*syn. excl.*).

1910. *Caloptenopsis johnstoni* Kirby, l.c., p. 549.
1910. *C*[*aloptenopsis*] *nigrovariegatus* Kirby, l.c., p. 550, no. 12.
1910. *C*[*aloptenopsis*] *laticosta* Kirby, l.c., p. 550, no. 14.

This species is very easily recognisable by the peculiar shape of the frontal ridge and vertex (see Karsch's description of *C. laticosta*), and it is very astonishing that it has been redescribed so many times under different names. The species varies considerably in its size, and Kirby's types of *C. johnstoni* are rather small, but there is no doubt that they are conspecific with *C. ferrifer* Walk., the type of which is also before me now, as well as with the fairly well-described *C. nigrovariegatus* Bol. and *C. laticosta* Karsch. It is very difficult to understand why Kirby considered *C. pallidicornis*, which is a quite different insect, as conspecific with *C. ferrifer*.

British Museum specimens: S. Africa, 1 ♂ (*Walker's type of C. ferrifer*); Baringo, 4000 ft. (*H. H. Johnston*), 3 ♂♂, 4 ♀♀ (*Kirby's types of C. johnstoni*); Zomba, 2000–3000 ft., 5 ♂♂, 1 ♀; Nyasaland (*A. Whyte*), 1 ♀; Zomba (*P. Rendall*), 1 ♀ (named by W. Kirby as *C. tibialis* Kirby); Mwera, Mabira Forest and Entebbe, Uganda (*C. C. Gowdey*), 3 ♀♀; Kilimandjaro, 3000–5000 ft., 1 ♀.

8. **Caloptenopsis macracanthus** M. Fern.

||1889. *C*[*aloptenus*] *calcaratus* I. Bolivar, Jorn. Sci. Lisboa, seg. ser., i, p. 172, no. 175 (*nec* Stål, 1876 !).
1902. *C*[*aloptenopsis*] *macracanthus* M. Fernandez, An. Soc. Esp. Hist. Natur., xxx, pp. 282, 287 (published June, 1902).
1902. *Calliptamus tibialis* Kirby, Trans. Ent. Soc. Lond., p. 110, no. 119 (*partim* !).
1902. *Caloptenopsis femoralis* Kirby, Ann. Mag. Nat. Hist., vol. 10, no. 57, p. 241, no. 5 (published September, 1902).
1910. *C*[*aloptenopsis*] *femoralis* Kirby, Syn. Cat. Orth., iii, p. 550.
1910. *C*[*aloptenopsis*] *macracanthus* Kirby, l.c., iii, p. 550, no. 9.

This species is rather closely related to the *C. ferrifer* Walk., but is easily distinguished from it by the much longer metazona of the pronotum.

British Museum specimens : Pretoria (*W. L. Distant*), 2 ♀♀. (*Kirby's type of C. femoralis, and one of his types of C. tibialis*).

9. **Caloptenopsis calcaratus** (Stål.).

1876. *C*[*alliptenus*] *calcaratus*, Stål, Bih. Sven. Vet.-Akad. Handl., iv (5), p. 13, no. 3.
1898. *C*[*aloptenus*] *orientalis* Schulthess, Ann. Mus. Genova xxxix, p. 194, no. 1.
1902. *C*[*aloptenopsis*] *calcaratus* M. Fernandez, An. Soc. Esp. Hist. Nat., xxx, pp. 282, 287.
1902. *C*[*aloptenopsis*] *orientalis* M. Fernandez, l.c., pp. 282, 292.
1902. *Calliptamus pachypus* Krauss, Anz. Akad. Wiss. Wien, vii, p. 5, no. 15.
1907. *C*[*alliptamus*] *pachypus* Krauss, Denkschr. Mat.-Nat. Kl. Akad. Wiss. Wien, lxxi, p. 24 (of a separate copy), pl. ii, fig. 7, 7*A*.
1910. *C*[*aloptenopsis*] *calcaratus* Kirby, Syn. Cat. Orth., iii, p. 550, no. 8.
1910. *C*[*aloptenopsis*] *orientalis* Kirby, l.c., p. 550, no. 11.

British Museum specimens : Socotra, 3 ♂♂, 4 ♀♀.

10. **Caloptenopsis decisus** (Walk.).

1870. *Caloptenus decisus*, Walker, Cat. Derm. Salt. B. M., iv, p. 700, no. 51.
1893. *Caloptenus baliensis* Brancsik, Jahresh. Ver. Trencs. Comit., xv–xvi, p. 195, pl. 12, fig. 5.
1902. *C*[*aloptenopsis*] *baliensis* M. Fernandez, An. Soc. Esp. Hist. Nat., xxx, pp. 282, 292.
1910. *C*[*aloptenopsis*] *baliensis* Kirby, Syn. Cat. Orth., iii, p. 550, no. 16.
1910. *E*[*uprepocnemis*] *decisus* Kirby, l.c., p. 561, no. 13.
1918. *Caloptenopsis madagascariensis* Sjöstedt, Ark. Zool., 12, no. 1, p. 16.

Walker's type of *C. decisus* agrees perfectly well with the descriptions of both *C. baliensis* and *C. madagascariensis*, and there is no doubt in my mind as to their identity.

British Museum specimen : Madagascar, 1 ♂ (*Walker's type*).

The four following species are not represented in the British Museum collection :—

11. **Caloptenopsis vittatus** (I. Bol.).

1889. *C*[*aloptenus*] *vittatus* I. Bolivar, Jorn. Sci. Lisboa, (2), i, p. 171, no. 173.
1902. *C*[*aloptenopsis*] *vittatus* M. Fernandez, An. Soc. Esp. Hist. Nat., xxx, pp. 282, 283.
1910. *C*[*aloptenopsis*] *vittatus* Kirby, Syn. Cat. Orth., iii, p. 549, no. 2.

It is not impossible that this species is identical with *C. mossambicus* Brancs., as its description recalls very much the colour form described by Karsch as *C. angusticosta*, but I abstain from synonymising them, because I have not seen any specimens of *C. mossambicus* from West Africa, whence the type of *C. vittatus* came.

12. **Caloptenopsis angusticeps** (I. Bol.).

1889. *C*[*aloptenus*] *angusticeps* I. Bolivar, Jorn. Sci. Lisboa, (2), i, p. 172, no. 176.
1902. *C*[*aloptenopsis*] *angusticeps* M. Fernandez, An. Soc. Esp. Hist. Nat., xxx, pp. 282, 283.
1910. *C*[*aloptenopsis*] *angusticeps* Kirby, Syn. Cat. Orth., iii, p. 549, no. 3.

Seems to be rather like *C. pallidicornis* Stål, but differs from it in the undeveloped lateral keels of metazona of pronotum. Probably a good species.

13. **Caloptenopsis karschi** M. Fern.

||1893. [*Euryphymus*] *calcaratus* Karsch (*nec* Stål), Berl. Ent. Ztschr., xxxviii, p. 103, no. 70.
1902. *Euryphymus karschi* (*nom. nov.*) M. Fern., An. Soc. Esp. Hist. Nat., xxx, p. 307.
1910. *C*[*aloptenopsis*] *karschi* Kirby, Syn. Cat. Orth., iii, p. 550, no. 15.

I do not think that this insect is conspecific with any other species, though it is very insufficiently described.

14. **Caloptenopsis v-plagiatus** (Bruner).

1910. *Caloptenus* >-*plagiatus* Bruner, Voeltzk. Reise Ostafr., ii, p. 642, pl. 27, fig. 16.

Since the name given to this insect by L. Bruner is not pronounceable, I propose to alter it to *v-plagiatus* according to the description of the species: "pronotum marked on the disk of the hind lobe by a v-shaped black patch the apex of which points to the rear."

The species, which has been described from Manda Island, British East Africa, seems to be very near to, if not identical with, *C. ferrifer* Walk., differing only in the peculiar mark on the pronotum which may be a result of a reduction of the median fascia usual to *C. ferrifer*. Its description and figure are, however, quite insufficient.

The following key to the species of *Caloptenopsis* known to me (*i. e.* except *vittatus*, *angusticeps*, *karschi* and *v-plagiatus*) may be useful:

1 (8) The lower inner spur of the hind tibiae with the apex simply recurved, without or with but short and not dense hairs.

2. (3) Lateral keels of pronotum almost parallel, hardly divergent backwards; hind angle obtuse, rounded; metazona scarcely longer than prozona. Fastigium between the eyes distinctly broader than the frontal ridge between antennae. Wings with the base rose.—India.
C. glaucopsis Walk.

3. (2) Lateral keels of pronotum strongly divergent backwards; hind angle straight, scarcely rounded; metazona much longer than prozona.

4. (7) Fastigium between the eyes not narrower than the frontal ridge at ocellum. Hind wings with the base rose.

5. (6) Frontal ridge with the margins somewhat raised. Pronotum more elongate and its lateral keels more strongly divergent. Elytra extending well beyond hind knees. Wings with the very base tinted with light rose.—N.E. Africa. . . . . *C. calcaratus* Stål.

6. (5) Frontal ridge with the margins very obtuse. Pronotum shorter, with the lateral keels less strongly divergent. Elytra scarcely extending beyond hind knees. Wings almost wholly bright rose.—E. Africa.
C. merucnsis Sjöst.

7. (4) Vertex between the eyes narrower than the frontal ridge at ocellum. Hind wings with the base bluish.
C. pallidicornis Stål.

8. (1) The lower inner spur of the hind tibiae with the apex prominent beyond the base of the claw, in the shape of an obtuse tubercle bearing dense and long hairs.

9. (12) Lateral keels of pronotum well developed, reaching its hind margin.
10. (11) Prosternal tubercle strongly cylindrical. Wings with the base rose.—India. . . . . *C. insignis* Walk.
11. (10) Prosternal tubercle distinctly compressed, with the apex transverse. Wings hyalinous.—Madagascar.
C. decisus Walk.
12. (9) Lateral keels of pronotum obliterate, at least in the metazona.
13. (18) Lateral keels of pronotum smooth in the prozona, punctured in the metazona.
14. (15) Prozona scarcely shorter than metazona. Frontal ridge much broader than the fastigium. Hind tibiae dirty-violaceous.—S.E. Africa. . . . . *C. ferrifer* Walk.
15. (14) Prozona distinctly shorter than metazona.
16. (17) Metazona more than one-half again as long as the prozona. Hind tibiae dirty-violaceous.—S.E. Africa.
C. macracanthus M. Fern.
17. (16) Metazona distinctly but not much longer than prozona. Hind tibiae red or yellowish.—S.E. Africa.
C. mossambicus Brancs.
18. (13) Lateral keels of pronotum punctured throughout, almost obliterate.—W. Africa. . . . *C. unicarinatus* Krauss.

Genus Calliptamus Serv.

There are seven species of this genus in Kirby's Catalogue (iii, p. 549–551), but three of them (*C. marmoratus* F.-W., *C. ccphalotes* F.-W. and *C. discoidalis* Walk.) are conspecific with *C. italicus* L.; *C. tarsius* F.-W. is a synonym of *Euprepocnemis plorans* Charp.; and *C. scutifer* Walk. has been made by Kirby the type of a distinct genus, *Brachyxenia*. Thus, only two species remain in the genus *Calliptamus*: the common South-Palaearctic *C. italicus* L., and the Canarian *C. vulcanius* Krauss., because the two African species described more recently (*C. v-plagiatus* Brun. and *C. meruensis* Sjöst.) belong to the genus *Caloptenopsis*, and *C. abbreviatus* Ikonn. from Corea is scarcely specifically distinct from *C. italicus*, representing the form of the latter species known as var. *icterica* Serv. (= *wattenwyliana* Pant.; see H. Karny in Wiss. Erg. Exped. Filchner nach China u. Tibet, x, 1, p. 35, 1908).

The genus has an excellent character in the structure

of the male cerci, which enables me to separate it from all its nearest relatives (*Caloptenopsis*, *Paracaloptenus*, *Brachyxenia*) : the cerci of *Caloptenus* are armed with *two* obtuse subapical teeth, while in other genera the cerci bear only *one* rather long and acute subapical spine (Plate I, figs. 1 and 2).

1. Calliptamus italicus (L.)

(Plate I, fig. 1.)

To the numerous synonyms of this species (see Kirby's Catalogue, iii, pp. 551–553) six more must be added, as follows :—

1846. *Calliptamus marmoratus* Fisch.-Waldh., Orth. Imp. Ross., p. 242, no. 5.
1846. *Calliptamus cephalotes* Fisch.-Waldh., l.c., p. 243, no. 6 (identical with var. *icterica* Serv.).
1870. *Caloptenus discoidalis* Walk., Cat. Derm. Salt. B. M., iv, p. 686, no. 23.
1908. *Calliptamus ictericus* Karny, Wiss. Erg. Exped. Filchner, x, 1, p. 35.
1913. *Calliptamus abbreviatus* Ikonnikov, Über die von P. Schmidt aus Korea mitgebrachten Acridiodeen, p. 21.
1914. *Caloptenopsis punctata* Kirby, Fauna Brit. India, Acrid., pp. 258 and 260, no. 320, fig. 138.

The variability of this species is a well-known fact, but nobody has yet tried to undertake a serious study of its numerous forms, some of which are very striking and rather constant. As the species is so extremely common and numerous all over South Europe, it might present an excellent object for the experimental study of variations, which should be of great help to systematists. As the case stands now, it seems to me quite useless to attempt a classification of varieties based upon collection specimens only, and I prefer to take the species in its widest sense, without any subdivisions.

British Museum specimens : As the distribution of this species throughout the Mediterranean subregion is well known, I shall not give here the records of Museum specimens from that subregion. The occurrence of *C. italicus* L. in Baltistan (Kashmir) is, however, very interesting, and the more so, as the Museum collection contains several

specimens of *C. italicus* taken there, together with several specimens of *Caloptenopsis glaucopsis* Walk., which is extremely like the former species in its habitus and coloration, but, of course, easily distinguished by the shape of tibial spurs and other generic characters. One of the specimens of *C. italicus* from Baltistan is Kirby's type of *Caloptenopsis punctata.*

2. Calliptamus vulcanius (Krauss).

1892. *Caloptenus vulcanius* Krauss, Zool. Anz., xv, p. 167, no. 42.
1910. *C*[*alliptamus*] *vulcanius* Kirby, Syn. Cat. Orth., iii, p. 553, no. 3.
British Museum specimen : Teneriffe (*Capt. Beechey*), 1 ♀.

According to the original description, this species differs from *C. italicus* by the straight pronotal carinae and the coloration of wings, which are hyalinous at the base and infumate apically. The single female specimen in the Museum collection is very badly preserved, and I am unable to express any definite opinion as to the systematic value of the above-mentioned characters; the interrelation of *C. italicus* and *C. vulcanius* must be studied by long series of specimens.

Genus Paracaloptenus Bol.

There are two species included in this genus in Kirby's Catalogue, as well as in M. Fernandez's revision, but I am rather doubtful whether *P. obesus* Bol., known by the female sex only, really belongs here; most probably it represents a distinct genus. Thus, only one species remains in the genus, the Mediterranean *P. caloptenoides* Br. Watt.

1. Paracaloptenus caloptenoides (Br. Watt.).

I find it unnecessary to repeat the synonymy of this species, correctly given by Kirby (Syn. Cat. Orth., iii, p. 553).
British Museum specimens : Corfu, 1 ♂, 1 ♀ (purchased from Brunner v. Wattenwyl); Belgrade, Serbia, 1 ♀; Anninger Wald, Austria, 1 ♂.

Genus Peripolus M. Fern.

1902. *Peripolus* M. Fernandez, An. Soc. Esp. Hist. Nat., pp. 258, 303.

I do not know the male of this genus, but according to the original description, its cerci and anal plate are not quite of the same type as in the preceding genera. The hind femora, also, are rather narrow for a member of the group *Calliptamini*. There is only one species known.

1. **Peripolus pedarius** (Stål).

1878. *C[alliptenus] pedarius* Stål, Bih. Sven. Akad. Handl., v. (4), p. 75, no. 1.
1902. *P[eripolus] pedarius* M. Fernandez, An. Soc. Esp. Hist. Nat., xxx, p. 303.
1910. *P[eripolus] pedarius* Kirby, Syn. Cat. Orth., iii, p. 554, no. 1.
1914. *Peripolus pedarius* Kirby, Fauna Brit. India, Acrid., p. 261, no. 321.

British Museum specimen : Darjeeling, 2 ♀♀.

Amblyphymus, gen. nov.

Finely rugose, but not at all tuberculate. Antennae slightly compressed, very feebly widened beyond the basal third. Face slightly reclinate; frontal ridge in profile slightly convex; its margins straight, feebly divergent downwards, smooth; the surface flat and strongly punctured above the ocellum, impressed below the latter. Fastigium of vertex sloping, forming an obtuse, rounded angle with the frontal ridge; elongato-hexagonal, feebly impressed. Temporal foveolae rather distinct, though imperfectly marginate from below, small, triangular. Occiput with a feeble and short median carinula, with more or less developed radial rugosities behind the eyes. Eyes large, oval, distinctly higher than long and slightly higher than the subocular sulci; their fore margin slightly convex. Cheeks rugulose, with oblique sulci feeble. Pronotum not strongly compressed laterally; disc more or less convex; median keel low, but well developed, acute, in profile scarcely convex, feebly cut by the transverse sulci; the hind sulcus distinctly behind the middle; lateral keels very feeble and obtuse in the prozona, obliterate in the metazona, deeply cut by the sulci; fore margin of the disc convex; hind angle obtuse; lateral lobes a

little higher than long, with the lower margin rotundato-prominent in the middle; hind angle obtuse, rounded; fore margin sinuate. Prosternal tubercle low, conical or narrowed towards the obtuse apex. Mesosternal interspace trapezoidal, in the male almost as broad as long, in the female distinctly transverse. Elytra more or less abbreviated; wings coloured, with the fore margin dark. Hind femora strongly dilated and distinctly incrassate, especially in the male; upper carina strongly serrate; lower margin of the externomedian area straight, or nearly so; lower outer area convex, widest beyond the middle; lower carina straight from the base up to the middle or even beyond it, then convex; inner lower area dilated. Hind tibiae more or less bent.

♂. The last tergite dilated and incrassate, with a large rotundato-trapezoidal emargination. Supra-anal plate trapezoidal with the hind angles obtuse; a narrow apical lobe; a row of four tubercles about the middle; median carina low, sulcate, narrowly bifurcate basally. Cerci hook-shaped with the apical (ascending) part longer than the basal part, laterally compressed and dilated at the apex. Subgenital plate small, very obtusely conical.

♀. Subgenital plate shallowly, but distinctly impressed along its middle; hind margin very obtusely produced, with two obtuse lateral emarginations. Lower valves of the ovipositor with broadly rounded basal teeth; apical parts narrow and small.

Genotype : *Amblyphymus miniatus*, sp. n.

In the structure of genitalia, both male and female, as well as in the shape of the hind legs, this genus is closely related to *Rhachitopis*, but differs from it in the far less rugose head and pronotum, better developed temporal foveolae, broader and less impressed fastigium of the vertex, abbreviated elytra, coloured wings, dilated at the apex male cerci and longitudinally sulcate female subgenital plate.

I know two species of this genus, both described below, and it is possible that *Euryphymus xanthocnemis* Brancs. also belongs here, but its description is practically worthless, being too short and based on the female sex only.

1. **Amblyphymus miniatus,** sp. n.

(Plate I, fig. 3.)

♂. Not large, but rather heavily built. The sides of the frontal ridge perfectly straight. Head almost smooth, but not at all shining. Pronotum not coarsely, but distinctly rugulose; disc distinctly

convex; hind margin very obtusely rotundato-angulate; lateral keels scarcely perceptible and interrupted in prozona, undeveloped in metazona; lateral lobes distinctly convex. Prosternal tubercle strongly conical, with the apex obtuse. Elytra not reaching the apex of the abdomen, strongly widened at the end of the basal third, with the apex narrowly triangular. Wings much shorter than the elytra. Hind margin of the last tergite strongly chitinised, slightly incrassate, feebly and irregularly serrulate, with a quite small prominence in the middle. Supra-anal plate broader than long; the two submedian tubercles in the shape of small, sharp carinulae, connected with each other; the lateral tubercles rather large, triangular. Cerci with the basal (descending) part somewhat thicker and about half as long as the apical part; the apical third strongly compressed laterally and dilated; the apex obliquely rotundato-truncate from behind.

General coloration brown. Face paler. Lateral lobes of the pronotum with a shining black spot, and a small pale spot below it. Elytra brown, with a few indefinite blackish spots. Wings bright red, with the fore margin blackish. Hind femora with a blackish triangular spot in the middle of the upperside, extending into the upper part of the inside; the latter dirty yellow, somewhat blackened near the apex; lower inner sulcus dirty yellow. Hind tibiae dirty yellow; spines with the apices black.

Length of body 22·5 mm.; of pronotum 6 mm.; of elytra 11 mm.; of hind femora 13·5 mm.

Dimensions of the paratypic female are as follows: Length of body 25 mm.; of pronotum 7·5 mm.; of elytra 12 mm.; of hind femora 15 mm.

The species is rather variable in its general coloration; thus one of the males from Beira is greyish-brown, with whitish and blackish spots; the hind femora are often with three blackish fasciae on the upperside and with black streaks in the lower outer sulcus. The morphological characters are, however, quite constant.

British Museum specimens: Mount Chirinda, Gaza Land, 1 iii. 1907 (*David Odendaal*), 9 ♂♂, 7 ♀♀; the same locality (*G. A. K. Marshall*), 1 ♂, 2 ♀♀; Beira, E. Africa (*G. A. Sheppard*), 3 ♂♂, 1 ♀ (*type and* 22 *paratypes*).

2. **Amblyphymus roseus,** sp. n.

Differs from *A. miniatus* by the following characters:—More compressed laterally; scarcely rugose. Frontal ridge with margins slightly sinuate below the ocellum. Disc of pronotum less convex;

hind angle about 90°; lateral carinae in prozona low, but well distinct, in metazona obliterate; lateral lobes only feebly convex. Prosternal tubercle narrowed towards the rounded apex, but not conical. Elytra in the male extending beyond the apex of the abdomen, but not reaching the hind knee, rather hyalinous, with the apex rounded. Wings only a little shorter than the elytra. Hind femora broader, but less incrassate. Male genitalia very much the same as in *A. miniatus*, but the emargination of last tergite is deeper and more rounded; there is no prominence on the last tergite; submedian tubercles of the supra-anal plate somewhat oblique, not connected with each other; lateral tubercles in the shape of small oblique carinulae.

General coloration dark-brown. Pronotum with two pale lateral fasciae. Elytra reddish-brown, with indefinite dark spots. Wings bright rose, with the fore margin darkened. Hind femora with three indefinite dark fasciae on the upperside, extending into the inside as well, but not reaching the lower half of the latter; the inner side dirty yellow; lower inner sulcus and the hind tibiae dirty yellow; the spines of the hind tibiae black.

In the paratypic female the elytra do not reach the apex of the abdomen.

Dimensions of the male type are as follows: Length of body (probably shrunk) 19 mm.; of pronotum 5·5 mm.; of elytra 13 mm.; of hind femur 12 mm.

Dimensions of the female paratype are: Length of body 27 mm.; of pronotum 7·5 mm.; of elytra 16 mm.; of hind femur 17 mm.

British Museum specimens: Masil nek (*W. L. Distant*), 1 ♂ (*type*; named by Kirby as *Euryphymus erythropus* Thunbg.); Pretoria, 4 iii. 1917, 1 ♀; Pretoria (*W. L. Distant*), 1 ♂ (*two latter being paratypes*).

Rhachitopis,* gen. nov.

Moderately rugose. Antennae very feebly compressed and scarcely dilated beyond the middle. Face vertical. Frontal ridge in profile straight, with the margins parallel, not at all, or but slightly approximate near the fastigium, with the surface more or less sulcate. Fastigium of the vertex strongly sloping, in profile convex, forming with the frontal ridge a widely rounded angle, not separated from the ridge by a transverse carina; its surface not strongly impressed; margins subparallel, sinuose before the apex because of

* = rachitic-looking, because of curved hind tibiae. It is a masculine name.

temporal foveolae, which are, however, small and very imperfectly developed and not at all marginate from below. Eyes rather prominent, oval, slightly higher than long, not higher than subocular distance. Cheeks more or less rugulose, with the oblique sulcus moderately deep. Pronotum rather compressed laterally, slightly narrowed anteriorly, more or less rugose; prozona convex; metazona, which is subequal to the prozona in length, flat; median keel feeble, sometimes scarcely perceptible; transverse sulci deep, practically straight; lateral keels indicated only by an interrupted row of feeble tubercles and carinulae, not reaching the hind margin; lateral lobes higher than long, with the lower margin straight in the hind half, rotundato-angulate, but not prominent, in the middle, and ascending in the fore half; fore angle very obtuse, rounded; hind angle a little more than 90°, rounded; hind angle of the disc about 90°, scarcely rounded. Prosternal tubercle not at all or but slightly longer than broad, more or less distinctly compressed in transverse direction, obtusely triangular, or with the apex strongly rounded, not truncate. Mesosternal interspace in the male subequal to, or slightly more narrow than, one of the lobes; in the female transverse, distinctly broader than one of the lobes. Elytra with the fore margin strongly prominent in the basal half, distinctly narrowed apically, with a rather sparse reticulation. Hind femora of the male strongly incrassate, with lower margin of the externomedian area distinctly inwardly bent; the lower outer sulcus feebly impressed and sometimes even slightly convex; lower carina from the base (where it is low and in some species even almost obliterate) up to the middle straight, strongly convex just beyond the middle, and again straight near the apex; the broadest part of the lower outer sulcus just beyond the middle; lower inner sulcus dilated, almost flat, or even slightly convex. Hind femora of the female less incrassate than those of the male; the lower carina of the externomedian area straight; lower outer sulcus less dilated, its broadest part beyond the middle; lower inner sulcus feebly dilated, scarcely concave. Hind tibiae of the male distinctly, or even strongly incurved; of the female practically or quite straight.

♂. Two last abdominal segments widened and incrassate; the hind one with a deep rotundate emargination, with the hind margin strongly chitinised, depressed. Supra-anal plate transverse; hind angles straight, or nearly so, not rounded; hind margin truncate, with a triangular lobe and small emarginations at the base of the latter; median keel feeble, sulcate throughout and bifurcate basally; a transverse row of four chitinous tubercles in the middle, and one tubercle at the base of the median sulcus. Cerci hook-shaped, vertical, with the apical (ascending) part longer than the basal one,

and prominent above the supra-anal plate, not acuminate apically. Subgenital plate small, very obtuse.

♀. Subgenital plate with a feeble, but distinct, convex transverse sulcus beyond the middle; the apex broadly triangular. Lower valves of the ovipositor with broad rounded teeth and small, narrow apical parts.

Genotype : *Caloptenus crassus* Walk.

It is a very well-defined genus, easily recognised by the hooked male cerci, incrassate hind femora, curved hind tibiae and the prosternal tubercle not truncate but either triangular, or with the apex strongly rounded. The following species, known to me by specimens, belong here : *crassus* Walk., *ceraseus*, sp. n., and *nigripes*, sp. n. From the species previously described by different authors under *Caloptenus* and *Euryphymus* the following ones (unknown to me save by descriptions) should be also included into *Rhachitopis : melanopus* Burm., *saphiripes* Serv., *curvipes* Stål, *vylderi* Stål (?), *adspersus* Bol., *stolidus* Bol. As the majority of species are not known to me, I will not attempt to draw a key to species, and proceed to describe those in the British Museum collection.

1. **Rhachitopis crassus** (Walk.).

1870. *Caloptenus crassus* Walker, Cat. Derm. Salt. B. M., iv, pp. 690, 694, no. 39 (*partim* !).

1910. *E*[*uryphymus*] *crassus* Kirby, Syn. Cat. Orth., iii, p. 547, no. 17 (*syn. excl.* !).

C. illepidus Walk. (= *pinguis* Walk.), which has been regarded by Kirby as conspecific with *crassus*, is really not even congeneric with it and belongs to the new genus *Platyphymus* (see below). The specimens labelled by Kirby as the types of *C. crassus* Walk. belong to two distinct species, and I have selected one male as the holotype of *crassus*, while the second species is described below as *nigripes*, sp. n. A supplementary description of *crassus*, should be, I believe, useful; it is as follows :—

Head moderately, pronotum distinctly rugose. Median keel of pronotum between sulci very low, not higher than the tubercles on the disc between sulci; lateral keels scarcely distinct in prozona, none in metazona; metazona longitudinally rugulose. Lateral lobes with a whitish callous spot in the middle and a shining black

spot above it. Supra-anal plate of the male with the outer margins slightly convex, and the hind angles somewhat rounded, with four tubercles in a transverse row and a tubercle in the basal sulcus. Male cerci with the ascending part very feebly bent forward, equally wide all along, obtusely truncate at the apex, a little more than twice as long as the basal (descending) part.

Dimensions of the type are as follows: Length of body 19 mm.; of pronotum 5 mm.; of elytra 14·5 mm.; of hind femur 12 mm.

Dimensions of one of paratypic females are: Length of body 22·5 mm.; of pronotum 5·5 mm.; of elytra 16 mm.; of hind femur 12·5 mm.

British Museum specimens: South Africa (*A. Smith*), 2 ♂♂, 4 ♀♀ (*Walker's types*).

2. **Rhachitopis nigripes**, sp. n.

1870. *Caloptenus crassus* Walker, Cat. Derm. Salt. B. M., iv, p. 694, no. 39, f.

♂. Somewhat larger than *R. crassus* Walk., moderately rugose. Frontal ridge parallel-sided, sulcate throughout, but obliterate just before the clypeus. Fastigium of vertex about twice as broad as the frontal ridge, very feebly impressed. Median keel of pronotum feeble, especially so between the sulci; lateral keels feeble, but subobliterate between the sulci only, almost reaching the hind margin of the pronotum; disc feebly rugose; tubercles between the sulci small; metazona with but a few small, scattered tubercles. The last abdominal segment obtusangularly excised, the sides of the emargination slightly sinuate. Supra-anal plate trapezoidal; outer margins straight; hind angles a little more than 90°, not rounded; median keel low and broad, widely bifurcate in the basal half, narrowly sulcate in the apical part; a chitinous tubercle in the middle of the basal impression; two tubercles near the median keel, beyond the middle; two smaller tubercles on the same line with the two submedian ones, but close to the outer margins. Cerci with the basal part thick, punctured; the apical (ascending) part not twice as long as the basal, slightly bent forwards and outwards; the apex blunt, but not truncate, projecting only a little above the supra-anal plate.

General coloration brownish-ochraceous, uniform. Elytra with a few indistinct darker spots. Hind femora with the indistinct dark fasciae on the upperside; the whole inner side shining black, with a very sharp, quite transverse pale ring before the apex; the knee brown, with the inner lobe pale and with a very narrow black ring

all round the base; lower inner sulcus pale with the black colour from the inner side partly extending into it. Hind tibiae on the inner side brownish, with a sharp postbasal ring, and another ring, less distinct, behind the middle, pale. Middle part of the two last tergites, the whole hind margin of the anal tergite, tubercles of the supra-anal plate and the end of the cerci, black.

Length of body 21 mm.; of pronotum 5·5 mm.; of elytra 16 mm.; of hind femur 13 mm.

Dimensions of a female (paratype) are as follows: Length of body 25 mm. (somewhat contracted); of pronotum 7·5 mm.; of elytra 19 mm.; of hind femur 16·5 mm.

British Museum specimens: Cape Colony (*Dr. Kraus col.*), 1 ♂ (*type*; at the same time it is the specimen "f" of *Caloptenus crassus* Walk.); S. Africa, 2 ♂♂, 1 ♀ (*paratypes*).

3. Rhachitopis ceraseus, sp. n.

(Plate I, fig. 4.)

♂. Larger and more rugose than any of the two species described above. Frontal ridge with the margins parallel, but not quite straight, owing to the rugosities of the face, sulcate throughout, almost reaching the clypeus. Fastigium of vertex distinctly impressed. Pronotum strongly rugose; median keel before the first sulcus almost cristate, though low, between the sulci low, not higher than the rather large tubercles, in metazona subcristate in the fore half and gradually lowered towards the hind angle. Last tergite widely rotundato-emarginate. Supra-anal plate trapezoidal; outer margins straight; hind angles about 90°, not rounded, even slightly attenuate; median keel low, sulcate throughout, bifurcate in the basal third; two small submedian tubercles and two larger submarginal ones; one small tubercle in the basal impression. Cerci with the basal (descending) part somewhat incrassate, punctured; the apical (ascending) part slightly curved outwardly, more than twice as long as the basal part, with the apex somewhat thickened and rotundato-truncate, distinctly projecting above the supra-anal plate.

General coloration reddish-brown, with indefinite brownish and whitish marmoration and spots. Face reddish, with white and brown marks; cheeks whitish. Lateral lobes of pronotum with a pale submedian spot and a blackish spot above it. Elytra with indefinite brownish spots, forming irregular fasciae. Hind femora with two brown fasciae on the upperside; the lower inner sulcus dark cherry-red, the same colour extending to the lower part of

the inner side, while the rest of the latter is shining black, except the bright yellow apex. Hind tibiae yellow, with scarcely perceptible brownish rings. Hind margins of all abdominal segments, almost the whole of the last tergite and the end of the cerci, black.

Length of body 26 mm.; of pronotum 7 mm.; of elytra 23 mm.; of hind femora 14·5 mm.

Dimensions of the paratypic female are as follows: Length of body 29 mm.; of pronotum 9 mm.; of elytra 25 mm.; of hind femora 18 mm.

British Museum specimens: Herbert, Cape Province, 15 v. 1917, 1 ♂ (*type*); Stijdenburg, Cape Province, 26 ii. 1917, 1 ♀; Orange Free State, Bloemfontein distr., Bethulie, Dealesville to Bloemfontein, Petrusburg, 4 ♂♂, 1 ♀ (*all the foregoing specimens collected by Ch. Lounsbury and J. Faure*); Orange River Colony, 8 ♂♂, 23 ♀♀ (*G. E. H. B.-Hamilton*) (*the last* 37 *specimens are cotypes*).

The sculpture of the head and pronotum is somewhat variable in this species, but other morphological characters are constant.

Platyphymus, gen. nov.

Related to *Platacanthoides* Kirby, but differing from in the following characters:—

Not smooth, but more or less granulose. Frontal ridge in profile strongly prominent between the antennae, and therefore decidedly reclinate, more so in males. Fastigium of vertex in males elongato-pentagonal, distinctly impressed, in the females rotundato-pentagonal, feebly impressed, in both sexes distinctly, though not sharply, separated from the frontal ridge. Cheeks more or less rugulose and granulose, with the oblique sulcus distinct. Disc of the pronotum with, at least, one pair of small callous tubercles between the second and the third sulcus, often with additional tubercles and granules scattered elsewhere.

♂. Supra-anal plate distinctly narrowed posteriorly, rotundato-trapezoidal; a pair of basal chitinous tubercles, one each side of the basal sulcus; a pair of tubercles close to the median keel beyond the middle of the plate, and a pair of transverse carinulae sideways from these latter tubercles; lateral margins with a slight inflexion opposite these carinulae; hind angles widely rounded. Cerci hook-shaped, with both basal and apical parts vertical and practically equally thick; the apical part distinctly longer than the basal, with the apex obtuse, or somewhat widened.

♀. Lower valves of the ovipositor with the apical parts narrow, distinctly denticulate basally.

Genotype: *Platyphymus granulatus*, sp. n.

Besides the genotype to this genus belong one more new species, *Caloptenus illepidus* Walk. and *Euryphymus tricostatus* Bol.

1. **Platyphymus granulatus,** sp. n.

(Plate I, figs. 5 and 6.)

♂. Moderately rugose and with numerous callous granules and tubercles. Antennae somewhat thickened, scarcely compressed. Frontal ridge between the antennae flat, with a few punctures, at the ocellum and below narrowly impressed. Cheeks with callous granules forming oblique rows each side of the oblique sulcus. Fastigium of the vertex elongato-hexagonal, about twice as long as broad, with the apex very narrowly truncate; its surface distinctly impressed. Occiput with a fine carinula and radial postocular callosities. Pronotum rather thick, strongly narrowed anteriorly; the disc slightly tectiform; median keel slightly raised, thick, shining, with a very fine longitudinal furrow, distinctly cut by the third sulcus only; lateral keels well developed, thick, shining, irregular, deeply cut by the transverse sulci, distinctly divergent between the fore margin and the second sulcus, less so from the second sulcus to the hind margin, the distance between them at the hind margin being half again as much as the distance at the fore margin; prozona scarcely longer than metazona, with a pair of small callous tubercles between the first and the second sulcus, and two pairs between the second and the third sulcus, the hindmost tubercles being the largest and very conspicuous; metazona with scattered small tubercles, especially near to the hind margin; fore margin distinctly rotundato-prominent; hind angle straight, not at all rounded, with the sides incrassate and slightly concave; lateral lobes with callous tubercles and rugosities. Prosternal tubercle widened towards the apex which is rotundato-truncate. Elytra reaching the base of the hind knees. The last tergite with a small prominent tooth in the middle of the hind margin. Supra-anal plate broader than long, rotundato-trapezoidal, with the lateral margins rounded and distinctly incised opposite the transverse carinulae; hind angles widely rounded; hind median projection rather thick, with a small emargination at each side of its base; median keel low in the apical half and distinctly raised in the basal half, where it is bifurcate; two large and low chitinous

tubercles at the very base of the plate; two smaller tubercles close to the median keel behind its middle; and two transverse carinulae, almost reaching the lateral margins, sideways from the last-mentioned tubercles. Cerci hook-shaped, vertical; the basal part a little thicker than the apical part, with an obtuse upper projection directed somewhat obliquely upwards; the apical part about twice as long as the basal, slightly and regularly bent, with the apex obtuse.

General coloration reddish-brown. Face and cheeks yellowish-ivory, with brown longitudinal stripes. Occiput behind the eyes somewhat blackish, with the callosities yellowish. Pronotum with a blackish fascia in prozona, along the median keel, constricted before the middle; metazona unicolorous, darker at its fore part; callous tubercles paler; lateral lobes with an ivory callosity in the middle, surrounded by an indefinite blackish spot. Elytra with indistinct brownish spots. Hind femora with the base of the upperside and two spots on it brown; the outer side with indefinite oblique dark fasciae; the inner side (possibly bleached) pale with two indefinite brownish spots along the upper margin; the lower inner sulcus pale. Hind tibiae pale.

Length of body (somewhat contracted) 18 mm.; of pronotum 5·5 mm.; of elytra 12·5 mm.; of hind femur 11·5 mm.

The paratypic female has more distinct markings on the pronotum and elytra, but is otherwise very like the male type. Its dimensions are as follows: Length of body 25 mm.; of pronotum 7·5 mm.; of elytra 14 mm.; of hind femur 13·5 mm.

British Museum specimens: Baringo, 4000 ft., 20 xii. 1912 (*Sir H. H. Johnston*), 7 ♂♂, 7 ♀♀ (*type and* 13 *paratypes*).

2. **Platyphymus bigranosus**, sp. n.

♂. Less rugulose and granulose than *P. granulatus* Uvar. and more compressed laterally. Frontal ridge below the ocellum distinctly excavate. Fastigium of vertex less than twice as long as broad, not deeply impressed. Cheeks scarcely granulose; oblique sulcus distinct. Occiput without radial postocular callosities. Pronotum distinctly compressed laterally, feebly narrowed anteriorly; median keel low, but thick, shining, feebly cut by the transverse sulci; metazona subequal in length to prozona; the latter with a pair of distinct callous tubercles close to the third sulcus and another, scarcely perceptible, pair before the second sulcus, while the rest of the disc is punctured, more closely so in metazona, but not granulose; lateral keels low, thick, shining,

straight, feebly divergent towards the hind margin, which they do not reach by a short distance, distinctly cut by the sulci; lateral lobes rugulose. Prosternal tubercle distinctly widened and emarginate apically. Elytra not reaching the hind knees. Last tergite with a small tooth in the middle of the hind margin. Supra-anal plate much the same as in *P. granulatus*. Cerci with the apical part distinctly widened towards the obliquely truncate apex.

General coloration brownish-grey (very much bleached by spirit). Pronotum with the metazona darker than the prozona; the latter with a median fascia, constricted before the middle. Elytra with indefinite grey spots. Hind femora with two brown fasciae on the upperside; the inner side greyish-pale (probably bleached); a blackish narrow ring at the knee-base. Hind tibiae pale.

Length of body (somewhat contracted) 17·5 mm.; of pronotum 5·5 mm.; of elytra 12 mm.; of hind femora 12 mm.

British Museum specimen: Ngatana, British East Africa (*Gregory Coll.*), 1 ♂ (*type*).

This species is easily separated from *P. granulatus* by the shape and sculpture of pronotum, the shape of the prosternal tubercle and cerci.

3. **Platyphymus illepidus** (Walk.).

1870. *Caloptenus illepidus* Walker, Cat. Derm. Salt. B. M., iv, pp. 690, 694, no. 40.
1870. *Caloptenus pinguis* Walker, l.c., pp. 690, 695, no. 41.
1910. *Caloptenus illepidus* Kirby, Syn. Cat. Orth., iii, p. 547.
1910. *Caloptenus pinguis* Kirby, l.c., p. 547.

There is no reason whatever to regard *C. illepidus* as conspecific with *C. crassus* Walk., they being not congeneric even; thus, Kirby is wrong in putting *illepidus* and *pinguis* (which really are conspecific with each other) as synonyms of *crassus*; he has been evidently misled by the somewhat similar coloration of hind femora in both these species. His definition of Walker's types of *illepidus* and *pinguis* in the British Museum collection is also somewhat dubious: Walker quotes two specimens (♂ and ♀) of *illepidus*, both from Natal, collected by M. Gueinzius, and only one of the specimens labelled by Kirby, as Walker's type, is a female from Gueinzius' collection, while another specimen is not a male, but also a female, from A. Smith's collection,

S. Africa. As for *C. pinguis*, instead of five specimens of Smith's collection, quoted by Walker, there is only one female from Gueinzius' collection, labelled by Kirby, as Walker's type of this species. It is not improbable that some of the actual Walker's types of *C. pinguis* belonged to *C. crassus*, but his descriptions of *illepidus* and *pinguis* leaves no doubt that they are quite different from *crassus*; tubercles on the pronotum supply us with sufficient evidence in support of this view. I have chosen as the holotype of *C. illepidus* the female specimen from Natal, of M. Gueinzius collection, and have no doubt in my mind that *illepidus* and *pinguis* are conspecific, the difference in the shape of prosternal tubercles being imaginary, as it is very often the case with the characters indicated by Walker, and I include this species provisionally in the genus *Platyphymus*, though the discovery of the male may only help to establish its relationship definitely.

There is nothing important to be added to Walker's original description of the species, which is easily separated from the two above described species by the somewhat larger size, thicker pronotum, with distinctly convex lateral keels and with only a pair of callous tubercles on the disc, which is finely punctured in the rest, as well as by the coloration of the hind-legs. The dimensions of the female holotype are as follows :—

Length of body 28 mm.; of pronotum about 7 mm. (the hind angle is broken); of elytra 17 mm.; of hind femora 10 mm.

Calliptamicus, gen. nov.

Resembling somewhat in the general appearance the genus *Calliptamus*, but differing strongly in the structure of genitalia and other important characters. Frontal ridge in profile feebly convex, moderately prominent between the antennae, distinctly reclinate; its surface flat or scarcely convex, indistinctly impressed below the ocellum in the male; the margins straight, gradually and feebly divergent downwards. Fastigium of the vertex sloping, elongato-oval, its surface scarcely impressed and very indistinctly separated from the frontal ridge. Eyes strongly prominent sideways, oval, distinctly higher than long and as long as the subocular sulcus is high. Cheeks smooth, with the oblique sulcus shallow, but distinct. Pronotum compressed laterally, distinctly narrowed anteriorly; the disc

almost flat; median keel sharp, low, in profile practically straight, scarcely cut by the transverse sulci; metazona slightly shorter than the prozona; lateral keels obtuse and low, but distinct, straight, strongly divergent backwards, cut by narrow sulci; hind angle of the disc very obtuse, but not at all rounded; lateral lobes with the lower margin rotundato-angulate in the middle. Prosternal tubercle distinctly longer than broad, slightly widened towards the apex, which is rotundato-truncate. Mesosternal interspace in the male not wider than long, in the female subquadrate. Elytra well developed. Wings faintly coloured at the base, slightly infumate towards the apex. Hind femora not at all incrassate and scarcely dilated, strongly narrowed and attenuate apically; the lower carina not at all dilated, regularly convex. Hind tibiae straight.

♂. The last tergite dilated, with the hind margin incrassate and somewhat recurved and rotundato-emarginate. Supra-anal plate broader than long, trapezoidal; median sulcus fine, but very distinct, not widened basally; two big chitinous tubercles sideways of the sulcus, before the middle of the plate; lateral margins rotundato-sinuate; hind angles slightly attenuate, sharp; hind margin somewhat concave, with a short median projecting lobe. Cerci hook-shaped; the basal part a little broader than the apical, which is strongly laterally compressed; the apex obliquely truncate. Subgenital plate obtusely conical.

♀. Subgenital plate scarcely longer than broad, with the apex truncate, and with two small, obtuse lateral lobes.

Genotype: *Calliptamus semiroseus* Serv.

It is a very peculiar genus with the hind femora slender for a member of the group *Calliptamini*. The shape of the male genitalia, however, leaves no doubt that it belongs here.

Only two species are known at present and they both are represented in the Museum collection.

1. **Calliptamicus semiroseus** (Serv.).

(Plate I, figs. 7 and 8.)

1839. *Calliptamus semiroseus* Serville, Ins. Orth., p. 692, no. 7.

1860. *Acridium* (*Calliptamus*) *hottentotum* Stål, Eug. Resa, Orth., p. 337, no. 90.

1870. *Caloptenus semiroseus*, var. Walker, Cat. Derm. Salt. B. M., p. 691, no. 32.

1870. *Caloptenus hottentotus* Walker, l.c., p. 692, no. 33.
1870. *Caloptenus plenipennis* Walker, l.c., p. 696, no. 43.
1870. *Caloptenus minor* Walk., l.c., p. 699, no. 48.
1873. *C*[*alliptenus*] (*Calliptenus*) *hottentotus* Stål, Rec. Orth., i, p. 73, no. 5.
1876. *E*[*uryphymus*] *hottentotus* Stål, Öfv. Vet. Akad. Förhand., no. 3, p. 43.
1902. *E*[*uryphymus*] *semiroseus* M. Fernandez, An. Soc. Esp. Hist. Nat., xxx, pp. 262, 276.
1902. *Calliptamus minor* Kirby, Trans. Ent. Soc. Lond., p. 240, no. 1186.
1910. *E*[*uryphymus*] *semiroseus* Kirby, Syn. Cat. Orth., iii, p. 546, no. 15.

The rosy tinge of the wings is sometimes very faint and often bleached in the collection specimens, which caused Walker to separate his *C. minor* from *C. semiroseus*, which are not distinct morphologically.

British Museum specimens: South Africa, 2 ♂♂, 3 ♀♀ (*Walker's types of C. semiroseus var., C. hottentotus, C. plenipennis, C. minor*); Newlands, Namaqualand (*C. D. Rudd*), 3 ♂♂, 8 ♀♀.

2. Calliptamicus antennatus (Kirby).

1902. *Calliptamus antennatus* Kirby, Trans. Ent. Soc. Lond., p. 109, no. 118.
1910. *E*[*uryphymus*] *antennatus* Kirby, Syn. Cat. Orth., iii, p. 547, no. 16.

Undoubtedly very close to the preceding species, with which it agrees well in all morphological characters, but differs in somewhat larger size and in the coloration; the hind wings in the type and another specimen (named by Kirby as *C. tibialis* Kirby !) are yellowish, faintly infumate towards the apex.

As Kirby has not given the dimensions of this species, I give them here: Length of body ♂ (*type*) 17·5 mm.; of pronotum 5 mm.; of elytra 16·5 mm.; of hind femora 14 mm.

British Museum specimens: Pretoria (*W. L. Distant*), 1 ♂ (*Kirby's type*); Johannesburg, 1 ♂ (named by Kirby as *Euryphymus erythropus* Thnbg. !); 1 ♀ (named by Kirby as *Calliptamus tibialis* Kirby !); Marico, Transvaal, 1 ♀.

Platacanthoides Kirby.

1870. *Platacanthus* Walk., Cat. Derm. Salt. B. M., iv, p. 714, genus 35 (preoccupied by Fischer in 1850 for a genus of fish).
1910. *Platacanthoides* Kirby, Syn. Cat. Orth., iii, p. 559.

Of middle size, not rugose. Antennae scarcely flattened. Face slightly reclinate. Frontal ridge in profile more or less convex, but only feebly prominent between the antennae, feebly impressed or flat; lateral margins straight, gradually and feebly divergent downwards. Fastigium of the vertex distinctly sloping, not separated from the frontal ridge and forming a widely rounded angle with it, elongato-hexagonal, or oval, in the females scarcely longer than broad; its surface almost flat, or slightly impressed. Cheeks smooth, with the oblique sulcus feeble. Eyes distinctly higher than long and than the suboecular sulcus is high. Pronotum with the disc almost flat, median keel well developed, in profile straight or nearly so, feebly cut by the transverse sulci; metazona subequal to prozona, or shorter; its hind angle obtuse, or straight, not at all, or but slightly rounded; lateral keels low, but distinct, complete, more or less convex, distinctly divergent backwards, reaching the hind margin; lateral lobes slightly convex, higher than long; lower margin rotundato-angulate in the middle. Prosternal tubercle widened towards the apex, which is emarginate, on truncate. Mesosternal interspace in the male slightly, in the female distinctly, transverse. Elytra and wings developed, but in the females not reaching the apex of the abdomen. Hind femora dilated, but scarcely incrassate, with the lower carina regularly convex. Hind tibiae in both sexes straight.

♂. (The description taken not from the genotype, in which the male is not yet known.) Last tergite dilated, with a deep and broad, rotundato-quadrangular emargination behind. Supra-anal plate subquadrate with only a pair of chitinous tubercles, with an obtuse median carinula, widely bifurcate in the basal half; hind angles straight; apical lobe small, with two small lateral emarginations at its base. Cerci strongly sinuate, or hook-shaped, with the basal part almost horizontal and dilated inwardly, the apical part vertical. Subgenital plate obtusely conical.

♀. Subgenital plate feebly convex; hind margin with an obtuse triangular projection and two not deep, rounded emarginations. Lower valves of the ovipositor short, obtusely dentate basally.

Genotype: *Platacanthus morosus* Walk.

The above re-description of this (Walker's) genus is

based partly on the genotype, partly on another species of the same genus, described below as new. Walker originally included in the genus *Platacanthus* three species, but he actually indicated *morosus*, as the genotype; two other species (*cervinus* and *includens*) are Australian and have been since removed to other genera (*Azelota* and *Exarna*, respectively).

1. **Platacanthoides morosus** (Walk.).

1870. *Platacanthus morosus* Walker, Cat. Derm. Salt. B. M., iv, p. 714, no. 1.

1910. *Platacanthoides morosus* Kirby, Syn. Cat. Orth., iii, p. 559, no. 1.

♀. Frontal ridge very feebly convex, scarcely impressed just below the ocellum, very minutely and indistinctly punctured near the fastigium, with the margins obtuse and not raised. Fastigium of the vertex scarcely impressed, oval, slightly longer than broad. Occiput with a feeble carinula. Pronotum with the median keel scarcely intersected by the first two sulci; lateral keels feebly convex, slightly cut by sulci; metazona distinctly shorter than the prozona, with the hind angle obtuse, rounded. Prosternal tubercle distinctly widened towards the obtusely emarginate apex.

Length of body 30 mm.; of pronotum 7 mm.; of elytra 16·5 mm.; of hind femora 17 mm.

British Museum specimen: S. Africa (*A. Smith*), 1 ♀ (*Walker's type*).

2. **Platacanthoides bituberculatus**, sp. n.

(Plate I, figs. 9 and 10.)

||1870. *Caloptenus crassus* Walker, Cat. Derm. Salt. B. M., iv, p. 694, no. 39 (*partim*).

♂. Smooth. Frontal ridge below the ocellum feebly impressed, above it distinctly punctured, with the margins somewhat raised. Fastigium of the vertex distinctly impressed, parallel-sided, about twice as long as broad. Occiput without a carinula. Pronotum with the median keel distinctly cut by three sulci; lateral keels practically straight, distinctly intersected by the sulci; metazona subequal to the prozona; hind angle a little more than 90°, slightly rounded apically. Elytra reaching the hind knees. Prosternal tubercle slightly widened towards the apex, which is rotundato-truncate. Supra-anal plate quadrangular, as broad as long;

median keel feeble, bifurcate in the basal third; two minute chitinous points close to the keel beyond the middle; the hind median projection small, decurved, with a rather deep and sharp emargination at each side of its base. Cerci with the basal part thick, almost horizontal; the apical part vertical, longer than the basal part, narrowed towards the obtuse apex, its fore inner margin somewhat expanded, and the hind margin with a round expansion near the base. Subgenital plate obtusely conical.

General coloration brownish-grey, with indefinite brownish markings. Elytra with rather large brownish spots. Wings hyaline, with the veins in the fore part brownish. Hind femora with indefinite dark spots on the upperside; the inner side yellowish (probably bleached) and almost wholly occupied by a black spot; a narrow black ring on the inner side before the knee. Hind tibiae yellowish.

Length of body 20 mm.; of pronotum 5·5 mm.; of elytra 16 mm.; of hind femora 13 mm.

British Museum specimen: S. Africa (*A. Smith*), 1 ♂ (*one of Walker's types of C. crassus*).

The species, of course, has nothing to do with the true *C.* (*Rachitopsis*) *crassus* Walk., and even the coloration of the hind femora does not agree with the Walker's description of that species.

2*a*. **Platacanthoides bituberculatus** var. **attenuatus,** n. var.

♂. Differs from the type by the following characters: elytra broader; prosternal tubercle very slightly emarginate at the apex; tubercles of the supra-anal plate larger, acute; apical part of the cerci more attenuate; the inner side of the hind femora black, margined with red; lower outer sulcus yellow.

Dimensions as in the typical form.

British Museum specimen: Wepenor, Orange Free State (Division of Entomology, Pretoria), 1 ♂ (*type of the variety*).

I do not think that the above-indicated characters are of a specific value; the difference in the coloration of the hind femora may depend on the type of the variety being better preserved than that of the typical form which is evidently much bleached.

Martinezius, gen. nov.

Related to *Plegmapterus* M. Fern., but well distinct from it by the practically smooth head and pronotum, as well as by the developed lateral keels of the latter.

Antennae filiform, not compressed. Face distinctly reclinate. Frontal ridge in profile convex between fastigium and antennae, straight in the lower part; its margins obtuse, not raised, somewhat approximated to each other near the fastigium, very feebly divergent downwards, strongly divergent in the lowest part, where they are almost obliterate; surface of the ridge smooth, with a few punctures in the upper part, and a feeble impression near the ocellum. Eyes strongly prominent, only slightly higher than long, almost round; fore margin convex though less so than the hind margin; subocular distance subequal to their length. Fastigium of vertex strongly sloping, forming an obtuse, rounded angle with the frontal ridge, twice as long as it is broad, somewhat widened forwards and again narrowed apically; its surface impressed; margins very obtuse, the apical ones even obliterate. Occiput very short, smooth. Cheeks practically smooth, with the oblique furrow scarcely developed. Pronotum compressed laterally, strongly narrowed anteriorly; disc slightly convex in prozona, flat in metazona; median keel very low and rather broad, with a scarcely perceptible sulcus all along, in profile practically straight, feebly interrupted by the first two sulci and rather deeply so by the hind sulcus, which is placed just before the middle; lateral keels very obtuse, deeply cut by the transverse sulci and therefore strongly sinuose, subparallel between the fore margin and the first sulcus, distinctly divergent between the first and third sulcus, subparallel in the metazona; fore margin of the disc practically straight; hind angle near to 90°, scarcely rounded, with the sides distinctly concave; lateral lobes slightly higher than long, with the lower margin very feebly rounded and in the fore third slightly ascending; fore angle obtuse, slightly rounded; hind angle almost straight but more rounded; hind margin straight, very oblique. Prosternal tubercle not broader than long, transversely compressed, almost quadrangular, with the apical angles rounded. Mesosternal interspace in the male slightly longer than broad, in the female scarcely transverse, in both sexes (especially in the male) more narrow than one of the lobes. Elytra much longer than the hind femora, distinctly narrowed basally, parallel-sided in the rest, with the apex rounded; their reticulation thick and dense. Wings coloured, with the apex infumate. Hind femora rather dilated, but not incrassate; the upper carina strongly serrulate; the lower carina rather dilated, but regularly convex. Hind tibiae a little shorter than the femora, straight.

♂. Last two tergites widened and incrassate; the anal segment deeply rotundate-emarginate, with the margin depressed and strongly chitinised. Supra-anal plate transverse, rotundato-trape-

zoidal, with a prominent apical lobe and low median carina, bifurcate basally; with two small chitinous tubercles near the carina, before the middle. Cerci vertical, consisting of a descending, rather thick basal part, and an ascending, thinner apical part, prominent above the supra-anal plate. Subgenital plate small, round.

♀. Subgenital plate with the apex prominent, with two rounded apical lateral emarginations.

Genotype: *Martinezius fernandezi*, sp. n.

This new genus is undoubtedly allied to *Plegmapterus*, as the reticulation of elytra is practically the same in both these genera, but it strongly differs from *Plegmapterus* by the above-indicated characters. There are, possibly, some more differentiating characters in the structure of the male genitalia, but the male of *Plegmapterus* is, as yet, unknown.

To the genus *Martinezius* belongs, probably, besides the genotype, *Euryphymus sinuosus*, M. Fern., which is unknown to me save by description.

I propose to name this beautiful insect after the first reviser of the group *Calliptamini*, Mr. Antonio Martinez y Fernandez-Castillo.

1. **Martinezius fernandezi**, sp. n.

(Plate I, figs. 11 and 12.)

♂. Ochraceous-brown, with brown design and spots; the under side and legs covered with rather long greyish hairs. Head and face brown with greyish marmoration. Pronotum very feebly regulose in the hind part of the metazona; its disc brown, in the metazona of a lighter shade, with indefinite narrow pale lateral fasciae; lateral lobes reddish-brown. Elytra greyish-ochraceous, with numerous small brown spots, rather equally distributed, somewhat confluent in the basal part. Wings golden yellow, with the veins and veinlets in the apical half brown, and the apex faintly infumate. Hind femora on the outer side brown, with indefinite dark fasciae on the somewhat paler-coloured upperside; the inner lower sulcus shining black, this colour extending partly also on the lower part of the inner side which is dirty yellow, merging into red at the apex; the hind knee unicolorous brown all over except the red inner lobe. Hind tibiae bright red with black tips of the spines. Hind tarsi orange-red.

Length of body 25·5 mm.; of pronotum 7 mm.; of elytra 23 mm.; of hind femur 14·5 mm.

♀ (paratype). Differs from the male by the disc of pronotum chocolate-brown all over, except the rather well-defined, narrow greyish lateral fasciae; and by the bright rose-coloured wings.

Length of body 35 mm.; of pronotum 9·5 mm.; of elytra 30 mm.; of hind femur 21 mm.

Another paratypic female is with golden-yellow wings, like the type male, but its hind tibiae are also golden-yellow, instead of being red.

The species differs from *M. sinuosus* M. Fern. (see above), so far as it may be established by the description of the latter, in the shape of the male cerci which in that species are dilated apically.

British Museum specimens: Deelfontein (*Col. Sloggett*), 1 ♂, 2 ♀♀ (*type and paratypes*).

Calliptamulus, gen. nov.

Very much alike in its habitus to *Calliptamus*, but small and strongly differing from it in the shape of the prosternal tubercle and of the male genitalia.

Antennae rather thick, very feebly widened beyond the middle. Face feebly reclinate, smooth, scarcely punctured. Frontal ridge in profile practically straight; its margins obtuse, slightly gradually divergent from fastigium towards the clypeus; the surface flat or only feebly impressed near the ocellum. Fastigium of vertex sloping, elongato-pentagonal, with the apex truncate; lateral carinae near the apex obliterate; apical transverse carina obliterate; surface feebly impressed. No temporal foveolae. Cheeks smooth; oblique sulcus feeble. Eyes rather large, oval, distinctly longer than the subocular sulcus is high, and distinctly higher than they are long. Occiput without a median carinula. Pronotum compressed laterally, but not constricted anteriorly; its disc almost flat or feebly convex; median carina in profile straight, low, but sharp, cut by three transverse sulci; metazona subequal in length to prozona, slightly rugulose; lateral keels well distinct, though low, straight or nearly so, gradually and feebly divergent backwards, reaching the hind margin or subobliterate quite close to it; lateral lobes scarcely convex, forming an almost straight angle with the disc, more or less rugulose, distinctly higher than long; their fore margin vertical, scarcely sinuate; fore angle very obtuse, widely rounded; lower margin rotundato-angulate in the middle; hind angle very obtuse, rounded; hind margin strongly oblique. Prosternal tubercle subtransverse, obtusely conical. Mesosternal interspace subquadrate, or slightly transverse in the male and distinctly trans-

verse in the female. Elytra developed, parallel-sided, with the apex rounded. Wings a little shorter than the elytra, hyaline or coloured. Hind femora short and broad, scarcely incrassate; the upper carina feebly denticulate; the lower carina regularly convex. Hind tibiae straight.

♂. The last tergite slightly widened on its sides, shallowly rotundato-emarginate on the upperside, with the hind margin somewhat incrassate. Supra-anal plate about as long as broad, with the sides widely rounded and with a short median projection behind; the median sulcus scarcely perceptible in the basal part only; no distinct chitinous tubercles, or only a pair of very small ones. Cerci almost horizontal; the basal part thick and broad; the apical part thin, gradually recurved; the apex obtuse or pointed. Subgenital plate obtusely conical.

♀. Subgenital plate with an obtusangular projection behind, and two shallow angular emarginations sideways from the projection; its surface feebly convex. Lower valves of the ovipositor, with the apical parts short, broad, obtuse, not dentate basally.

Genotype: *Calliptamulus sulfurescens*, sp. n.

This peculiar genus seems to be represented in South Africa by many species, since not less than three distinct new species may be recognised amongst quite a small lot of specimens now before me. The species are very close to each other, but still there are quite good characters which enables us to separate them without any difficulty.

1. **Calliptamulus sulfurescens,** sp. n.

(Plate I, fig. 20.)

♂. Frontal ridge feebly impressed near the ocellum, above it flat but with the margins somewhat raised. Fastigium of the vertex at the apex open, forming a widely rounded angle with the frontal ridge. Lateral keels of pronotum very distinct, but obtuse, almost straight, scarcely divergent backwards, reaching the hind margin; hind angle straight, not rounded. Mesosternal interspace slightly transverse. Elytra extending a little beyond the apex of the abdomen, but not reaching the hind knees. Supra-anal plate with two very minute, scarcely perceptible chitinous points before the middle. Cerci with the basal part a little longer than high; the apical part somewhat longer than the basal; the lower margin in the apical third obtusangulate; the upper margin of the apical part feebly and regularly concave; apex obtuse.

General coloration brownish-ochraceous, with brown markings.

Face and the whole of the head with brown dots and spots. Occiput with an ill-defined brown median fascia, widened posteriorly. Pronotum rather irregularly marmorated with brown; lateral keels paler and shining. Elytra pale-greyish, with a series of brownish spots along the middle. Wings feebly sulphurous basally, with the veins in the anterior part brownish. Hind femora marmorated and mottled with brown, with three not well-defined blackish spots and a preapical ring of the same colour, on the upperside; the inner side black, with the upper margin and the preapical ring yellow; the lower margin and lower inner sulcus bright red; inner knee lobe yellow, somewhat reddish at the base. Hind tibiae bright red, with brownish spots on the outer side, and with an inconspicuous yellow postbasal ring.

Length of body 16 mm.; of pronotum 4 mm.; of elytra 12 mm.; of hind femora 10 mm.

♀ (paratype). Differs from the male type by the somewhat convex lateral keels of the pronotum and by the elytra not reaching the apex of abdomen. Mesosternal interspace distinctly transverse.

Length of body 24·5 mm.; of pronotum 6 mm.; of elytra 14·5 mm.; of hind femora 13·5 mm.

British Museum specimens: Orange Free State: Bloemfontein, 11 ii. 1918, 1 ♂ (*type*); 24 ii. 1918, 1 ♂, 1 ♀; 7 iv. 1918, 1 ♀; Smithfield distr., 9 v. 1917, 1 ♂; Wepener, 6 vi. 1918, 1 ♀ (*the five latter considered paratypes;* all specimens sent by the Division of Entomology, Pretoria, and one male and one female returned to the Division).

2. **Calliptamulus hyalinus,** sp. n.

(Plate I, fig. 21.)

♂. Differs from *C. sulfurescens* Uvar., by the following characters:

Size somewhat larger. Frontal ridge sulcate almost throughout. Lateral keels of pronotum somewhat convex, obliterate behind the middle of the metazona. Mesosternal interspace distinctly transverse. Cerci with the apical part strongly pointed; the lower margin rather regularly convex; the upper margin of the apical part beyond its middle straight.

General coloration ochraceous, with very indistinct greyish spots. Wings whitish basally, with the veins in the fore part brownish. Hind femora with three very indefinite brownish spots on the upperside; the inner side sulphurous with a series of big blackish spots; the lower inner sulcus sulphurous. Hind tibiae sulphurous.

Length of body 16·5 mm.; of pronotum 4·5 mm.; of elytra 12·5 mm.; of hind femora 11·5 mm.

British Museum specimen : Petrus, Orange Free State, 23 i. 1919 (*type*; sent by the Division of Entomology, Pretoria).

3. Calliptamulus roseipennis, sp. n.

(Plate I, fig. 19.)

♂. Size as in *C. sulfurescens* Uvar. Differs from that species in the following characters :

Frontal ridge above the ocellum flat, strongly punctured, at the ocellum impressed. Fastigium of the vertex forming a distinct, though very obtuse and rounded angle with the frontal ridge. Pronotum shorter; lateral keels somewhat convex and distinctly divergent backwards, almost reaching the hind margin. Prosternal tubercle not triangular, but slightly narrowed towards the obtusely angulate apex. Supra-anal plate without any trace of chitinous tubercles, but with a very fine transverse sulcus. Cerci with the apical part subequal in length to the basal part; the lower margin convex from the base up to the apical third, then obtusangulate, and straight in the rest; upper margin of the apical part regularly concave; apex less obtuse than in *C. sulfurescens.*

General coloration brownish-grey, with dark-grey markings. Hind femora with three rather distinct blackish spots on the upper-side; the inner side yellowish-red, somewhat blackened along the upper margin and at the base; lower inner sulcus orange red. Hind tibiae bright red. Wings rose; the fore part strongly infumate.

Length of body 15 mm.; of pronotum 3·75 mm.; of elytra 12 mm.; of hind femora 10 mm.

Type in the Hope Museum, Oxford ; it is from Knysna, Concordia, Cape Province, 22 ii. 1914 (*J. B. Longstaff*).

Brachyphymus, gen. nov.

♂. Rather closely allied to *Euryphymus,* but less rugose, though not at all shining. Antennae filiform, not compressed. Face vertical sulcate throughout, the sulcus not separated from the impression of the vertex; margins below the ocellum bisinuose. Eyes strongly prominent, round, a little higher than long and scarcely higher than the subocular distance. Cheeks without a distinct oblique impressed furrow. Fastigium of vertex distinctly sloping, twice as broad as the frontal ridge below the ocellum, concave,

with margins parallel, convergent forwards where they are continuous with the margins of the frontal ridge, but not backwards. Occiput without a median carina and postocular radial rugosities. Pronotum rather compressed laterally, distinctly narrowed forwards; median keel well developed, but low, in profile straight, in prozona obtusely tridentate, in metazona slightly convex; third sulcus in the middle; lateral keels rather well developed, though obtuse, reaching the hind margin, but obliterate close to the fore margin and almost obliterate between the first and second sulcus, gradually divergent backwards, deeply cut by transverse sulci; fore margin rotundato-prominent; hind angle practically straight, rounded at the apex, with the sides somewhat concave; lateral lobes slightly higher than long, with the lower margin straight, fore angle obliquely truncate and rounded, hind angle straight, scarcely rounded. Prosternal tubercle short, thick, conical. Mesosternal interspace trapezoidal, a little broader than long and almost as wide as one of the lobes; metasternal interspace subquadrate. Elytra extending beyond the hind knees, with sparse, but thick reticulation. Wings not coloured. Hind femora short, moderately broad, not at all thickened; upper carina feebly serrulate; lower carina not dilated, regularly convex. Hind tibiae very feebly incurved, with 5–6 outer and 8 inner spines. Last tergite dilated and rotundato-emarginate. Supra-anal plate slightly broader than long, with the sides rounded and an apical lobe; median keel low, bifurcate basally; two rather large chitinous tubercles about the middle, close to the median keel. Cerci with thick basal part and round, attenuate and recurved apical part, with the apex rather acute. Subgenital plate small, round.

Genotype : *Brachyphymus sulfuripes*, sp. n.

This genus is easily separated from *Euryphymus*, to which it is rather closely allied, by the shape of the prosternal tubercle and of the cerci, which are of the same type as in *Calliptamulus*.

1. **Brachyphymus sulfuripes**, sp. n.

(Plate I, fig. 22.)

♂. Ochraceous, with abundant brick-red spots and dots, and with blackish design. Antennae whitish. Face pale, marmorated with brown. Cheeks whitish with brick-red marmoration. Fastigium of vertex with the apex brownish, and with a brick-red longitudinal fascia almost reaching the pronotum and including a more narrow blackish fascia. Pronotum on the upperside reddish-ochraceous, marmorated with brown, blackish along the lateral

keels; lateral lobes in metazona reddish, with large brick-red spots, in prozona with an ivory white callous spot in the middle and a blackish spot above it. Elytra with the scapular and radial veins brick-red, and all the hind half brownish, with a few scattered brownish spots along the middle and in the anal area. Wings hyalinous, scarcely infumate in the apical half, with the veins and veinlets in the fore half brown; the base very faintly yellowish. Abdomen yellowish, with chocolate spots along the sides and with the hind margins of sternites brown. Fore and middle femora brick-red and tibiae yellowish, marmorated with brown. Hind femora on the outer side ochraceous, with numerous brick-red spots and two interrupted blackish fasciae on the upperside; the lower outer sulcus whitish; lower inner sulcus and the inner side black, with the apex sulphurous; outer knee lobes unicolorous with the rest of the outer side, with a black point at the base, and the inner knee lobes sulphurous, also with a black basal point. Hind tibiae sulphurous with blackish streaks at the base, in the middle and at the apex of the inner side; the base of the outer side with brick-red spots; spines in the apical half black.

Length of body 19 mm.; of pronotum 5 mm.; of elytra 18 mm.; of hind femur 12 mm.

Described from a single male sent by the Division of Entomology, Pretoria, and captured at Strijdenburg, Cape Province, 26 ii. 1917.

British Museum specimen : the type.

Genus Euryphymus Stål.

1873. *Euryphymus* Stål, Rec. Orth., i, p. 72 (*partim* !).
1876. *Euryphymus* Stål, Öfv. K. Vet.-Akad. Förhandl., no. 3, p. 40 (*partim* !).
1877. *Euryphymus* Stål, Syst. Acrid., i, p. 30, no. 14 (*partim* !).
1902. *Euryphymus* M. Fernandez, An. Soc. Esp. Hist. Nat., xxx, pp. 258, 259 (*partim* !).
1907. *Phymeurus* Giglio-Tos, Boll. Mus. Torino, xxii (554), p. 27.
1910. *Phymeurus* Kirby, Syn. Cat. Orth., iii, p. 545.
1910. *Euryphymus* Kirby, l.c., pp. 545–548 (*partim* !).

When Stål described in 1873 the genus *Euryphymus* (which he regarded then as a subgenus of *Calliptenus*), he included in it only three species: *ferruginosus* St., *haematopus* L. and *erythropus* Thunbg., while he left

hottentotus St. in the subgenus *Calliptenus* (i. sp.). Three years later, in his paper on South African Orthoptera, he for some unknown reason altered his original conception of the genus *Euryphymus* by including in it *hottentotus* and two more new species, *curvipes* St. and *vylderi* St., which rendered the generic diagnosis extremely vague and indefinite. As a direct sequel of this, the genus *Euryphymus* became a kind of storing place for all African species of *Calliptamini* with the inner spurs of the hind tibiae not elongate (*i. e.* which could not be put into *Caloptenopsis*), however strikingly different from each other those species might be. As this group is very well developed in South Africa, the number of species described as "*Euryphymus*" speedily increased up to 19, as listed in M. Fernandez's revision. This latter author removed, though, one species—*ferruginosus* St. from *Euryphymus* and made it the type of a new genus, *Plegmapterus* M. Fern.; thus only two possible genotypes, viz. *haematopus* and *erythropus*, remained in the genus *Euryphymus*.

Giglio-Tos described in 1907 the genus *Phymeurus* with *Ph. pardalis* G.-T., as the genotype. It is quite obvious from the description of *Phymeurus* that Giglio-Tos compared it neither with *haematopus* nor with *erythropus*, but with some species of what had been at that time called *Euryphymus*. Moreover, there is no doubt that *Ph. pardalis* is very closely related to *haematopus* and obviously congeneric with it. Since Kirby has indicated *haematopus* as the genotype of *Euryphymus*, *Phymeurus* must be regarded as a pure synonym of *Euryphymus*, and the latter genus must be restricted to *haematopus* L., *eremobioides* Bol. and *tuberculatus* M. Fern., while *erythropus* Thunbg. presents a type of a distinct new genus.

The description of *Phymeurus*, as given by Giglio-Tos, may be used as generic diagnosis of *Euryphymus* in the restricted sense, with addition of characters of the male genitalia which are given in my key to the genera (see p. 120).

All other 35 species included in the genus *Euryphymus* in Kirby's Catalogue belong partly to several new genera described in this paper, partly to *Caloptenopsis* (*unicarinatus* Krauss, *marginipennis* Karsch and *glaucopsis* Walk.; see pp. 127 and 129 of this paper), while the generic position of several insufficiently described species of I. Bolivar and other authors, as well as of eight of Walker's species

(*exemptus*,* *testaceus*, *concisus*, *signatus*, *turbidus*, *mutator*, *cincticollis* and *reductus*) the types of which are lost, cannot be determined.

1. Euryphymus haematopus (L.).

(Plate I, fig. 13.)

I believe it superfluous to repeat here the synonymy of this species, quite correctly given by Kirby (Syn. Cat. Orth., iii, p. 546, no. 14).

The species reminds us very much of the *Tmethis muricatus* Pall. and is also extremely variable in the general coloration, as well as to a certain extent in the degree of development of rugosities and tubercles on the head and pronotum. The males are strikingly different from the females in the size, but there is no doubt as to their identity. The coloration of the inside of hind femora is, in all specimens studied by me, black except a narrow stripe along the upper margin and a preapical ring, which are either bright red or orange-red, as the hind tibiae also are. The dimensions of both sexes are as follows :—

	♂♂	♀♀
Length of body . . .	18–22 mm.	29–35 mm.
,, ,, pronotum . .	4·5–5	7–8·5
,, ,, elytra . .	16–18	25–30
,, ,, hind femora .	12–14	20–22

British Museum specimens : S. Africa, 2 ♀♀; Cape of Good Hope, 3 ♀♀; Stellenbosh, 1 ♂; Simonstown, 1 ♂ (*Philip de la Garde*); Saldanha Bay, 1 ♂, 1 ♀ (*Philip de la Garde*).

2. Euryphymus eremobioides (I. Bol.).

||1870. *Caloptenus haematopus* Walker, Cat. Derm. Salt. B. M., iv, p. 693, no. 35 (*partim* !).
1889. *E*[*uryphymus*] *eremobioides* I. Bolivar, Jorn. Sci. Lisboa, seg. ser., p. 168, no. 168.
1902. *E*[*uryphymus*] *eremobioides* M. Fernandez, An. Soc. Esp. Hist. Nat., xxx, pp. 260, 262.
1907. *P*[*hymeurus*] *pardalis* Giglio-Tos, Boll. Mus. Torino, xxii (554), p. 28.

* Kirby (Syn. Cat. Orth., iii, p. 547, no. 27) marked *E. exemptus* Walk. with two asterisks, meaning that its type is in the British Museum; but the insect under this name is a *Caloptenopsis*, and does not agree at all with Walker's description of *Acridium exemptum*.

1910. *P[hymeurus] pardalis* Kirby, Syn. Cat. Orth., iii, p. 545, no. 1.
1910. *P[hymeurus] eremobioides* Kirby, l.c., p. 545, no. 2.

There is very little doubt in my mind that *pardalis* Giglio-Tos is conspecific with *eremobioides* Bol., the only difference between them, so far as it may be concluded from Giglio-Tos's description, being the absolute size, which seems to be rather inconstant in all species of the genus.

British Museum specimen : Congo, 1 ♀ (this is specimen " f " of Walker's *Caloptenus haematopus* L.).

3. Euryphymus tuberculatus M. Fern.

(Plate I, fig. 14.)

1898. *Euryphymus tuberculatus* M. Fernandez, Actas Soc. Esp. Hist. Nat., Feb. 1898, p. 35.
1902. *E[uryphymus] tuberculatus* M. Fernandez, An. Soc. Esp. Hist. Nat., xxx, pp. 261, 267.
1910. *E[uryphymus] tuberculatus* Kirby, Syn. Cat. Orth., iii, p. 546, no. 12.

It is with a certain hesitation that I refer four specimens of *Euryphymus* to this species, described by the female only. Three specimens before me are males and one is female; the latter is somewhat larger than the type and has hind tibiae yellow, instead of red; the same coloration of hind tibiae is also in one of the males (from S. Rhodesia), while two other males are with hind tibiae red, as in the type. As I, however, do not think the coloration of tibiae an important specific character in this genus, I feel sure that all four specimens are conspecific with each other and, very probably, with *E. tuberculatus*.

British Museum specimen : Bloemfontein distr., Orange Free State, 8 v. 1917, 1 ♂ (*Division of Entomology, Pretoria*).

Hope Museum specimens : The Matopos, S. Rhodesia, 4500–5500 ft., 10 ix. 1905, 1 ♂ (*E. B. Poulton*); Warrenton, Cape Colony, about 3900 ft., 7 ix. 1905, 1 ♂, 1 ♀ (*E. B. Poulton*).

KEY TO THE SPECIES OF *EURYPHYMUS*.

1. (2) Male cerci in the apical half distinctly compressed and dilated, with the apex rounded, obtuse (fig. 13). Male anal

plate trapezoidal, broader than long, with the hind angles obtuse, rounded. Median keel of the pronotum high, distinctly compressed laterally; lateral keels formed each by a row of separate, sharp carinulae and tubercles. Hind tibiae red or orange on both sides. . . . . *E. haematopus* L.

2. (1) Male cerci in the apical half obtusely conical * (fig. 14). Male anal plate with the hind angles widely rounded. Lateral keels of the pronotum more or less continuous, interrupted only by furrows.
3. (4) Median keel of the pronotum high and thick. Hind tibiae greyish on the outer side and blackish on the inside, with the base coral-red. . . . . *E. eremobioides* Bol.
4. (3) Median keel of the pronotum thin and low. Hind tibiae of the same colour (red or yellow) on both sides.

E. tuberculatus M. Fern.

There is one more, probably new, species amongst the collection sent by the Division of Entomology, Pretoria, but it is represented by two females only, and I abstain from describing it.

Acrophymus, gen. nov.

Related to *Amblyphymus* Uvar., but differing from it in the shape of pronotum, of prosternal tubercle, of the male genitalia, as well as by the lateral elytra and undeveloped wings.

Finely ruguloso-punctate, but not at all tuberculate. Antennae scarcely compressed. Face slightly reclinate, rather rugose, frontal ridge in profile feebly convex, its surface perfectly flat, rather densely punctured above the median ocellum and sparsely below it, with the margins smooth, convex, feebly and gradually divergent towards the clypeus. Fastigium of the vertex distinctly sloping, elongato-hexagonal, with the surface scarcely impressed, margins slightly raised. Temporal foveolae small, very irregular, coarsely punctured. Occiput with a fine incomplete carinula, reaching the base of the fastigium. Eyes large, oval, distinctly higher than long, and slightly higher than the subocular sulcus, with the fore margin feebly convex. Cheeks scarcely rugulose, sparsely punctured, with the oblique sulcus feeble. Pronotum thick, neither laterally compressed, nor constricted; its disc distinctly convex; median keel low, but very distinct, in profile straight or slightly convex, feebly intersected by the three transverse sulci; prozona

* The male of *E. eremobioides* is known to me from Bolivar's and M. Fernandez' descriptions only.

half again as long as the metazona; lateral keels feebly developed, not raised, but perceptible, very slightly divergent from the fore margin towards the first sulcus, distinctly divergent and convex between the first and third sulcus, obliterate in the metazona; hind margin of the disc very widely rounded; lateral lobes distinctly convex, with a kind of very obtuse horizontal keel above the middle of the prozona, coarsely punctured throughout; their fore margin slightly sinuate; fore angle obtuse, rounded; lower margin rotundato-angulate before its middle; hind angle obtuse, rounded; hind margin very oblique, slightly sinuate near the lower angle. Prosternal tubercle with the basal part thick, transverse, but strongly attenuate and pointed apically. Mesosternal interspace trapezoidal, in the male about as broad as long, in the female strongly transverse. Elytra lateral, much shorter than the pronotum; preradial area strongly dilated and rotundato-emarginate behind; apex rather acute. Hind femora and tibiae as in *Amblyphymus*.

♂. The last tergite strongly dilated and inerassate, with a rectangular emargination. Supra-anal plate trapezoidal, longer than broad, with the hind angles obtuse; the apical projection rather thick and short; median sulcus narrow, with thick raised margins, not reaching the apex of the plate; a transverse row of four chitinous tubercles. Cerci directed obliquely backwards, reaching the apex of the supra-anal plate, with the basal half thick, obtusely projecting above the base of the apical part; the latter foliaceous, with the apex broadly rounded and incurved. Subgenital plate obtusely triangular.

♀. Subgenital plate widened posteriorly, shallowly rotundato bi-emarginate apically, with a scarcely perceptible median impression. Lower valves of the ovipositor with the basal parts broad, rounded, not dentate, and the apical parts small and narrow.

Genotype: *Euryphymus squamipennis* Brancs.
Euryphymus sigmoidalis Bol. also belongs here.

1. Acrophymus squamipennis (Brancs.).

(Plate I, fig. 15.)

1898. *Euryphymus squamipennis* Brancsik, Jahresh. Ver. Trencs. Com., xix–xx, p. 79, pl. 3, fig. 20*a–c*.
1900. *Euryphymus cuspidatus* Karsch, Entom. Nachr., xxvi, p. 282, fig.
1902. *E*[*uryphymus*] *squamipennis* M. Fernandez, An. Soc. Esp., xxx, pp. 262, 277.

1910. *E*[*uryphymus*] *squamipennis* Kirby, Syn. Cat. Orth., iii, p. 545, no. 4.
1910. *E*[*uryphymus*] *cuspidatus* Kirby, l.c., p. 545, no. 5.

The synonymy of *cuspidatus* Karsch and *squamipennis* Brancs. is beyond any doubt, though Brancsik's description of the male genitalia is incorrect (he evidently mistook the last tergite for the supra-anal plate), and Karsch does not describe them at all.

British Museum specimens : Salisbury, Mashonaland, (*G. A. K. Marshall*), 1 ♂, 3 ♀♀.

Hope Museum specimens : N.E. Rhodesia, Fort Jameson to Nyanji, 3000–3500 ft. (*S. A. Neave*), 1 ♂; S. Rhodesia, 6 miles W. of Feira, Mt. Kapsuku (*S. A. Neave*), 1 ♂, 1 ♀, *in copûla.*

Aneuryphymus, gen. nov.

Moderately rugulose. Antennae somewhat flattened, slightly dilated beyond the middle. Face vertical, practically smooth; frontal ridge in profile feebly convex; its margins straight, gradually divergent towards the clypeus; its surface above the ocellum nearly flat and punctured, below the ocellum impressed and smooth. Fastigium of vertex distinctly sloping, separated from the frontal ridge by a transverse keel, but not forming an angle with it; its general form is elongato-hexagonal, more than twice as long as broad and in both sexes slightly broader than the frontal ridge below the ocellum; its surface strongly impressed; lateral margins convergent behind. Occiput with a median carinula in its fore part, extending also on the fastigium; sometimes there are also two shorter lateral carinulae close to the middle one; postocular area with radial rugosities. Eyes oval, with the fore margin almost straight; their height exceeding a little the height of the subocular sulcus and subequal to one and a half of their length. Cheeks practically smooth, but with a deep oblique furrow and obtuse tubercles behind it. Pronotum strongly narrowed anteriorly moderately rugulose, with rugosities shining; fore margin very obtusely prominent; hind angle straight; median keel slightly raised, in profile practically straight, very feebly, or not all, cut by the two first sulci; the third sulcus a little more developed, but narrow, placed slightly before the middle; lateral keels well developed, though sometimes not reaching the hind margin, shining, very deeply cut by transverse sulci, feebly divergent towards the first sulcus, more divergent and convex between the first and third sulcus, subparallel and slightly concave in metazona; lateral lobes

with an irregular longitudinal ridge in the upper part of prozona; lower margin rounded and prominent just before the middle. Prosternal tubercle transverse, truncate. Mesosternal interspace transverse in female, slightly longer than broad in the male; metasternal interspace narrow in the male, and subtransverse in the female. Elytra developed; wings hyalinous. Hind femora broad and short, but not incrassate; upper carina denticulate; lower carina regularly convex. Hind tibiae straight. The two last tergites of the male dilated; the hind one emarginated, with the hind margin somewhat incrassate. Male supra-anal plate scarcely longer than broad, with the sides regularly rounded, and with an obtuse apical tooth; its median keel rather raised, bifurcate at the base; two short, oblique chitinous ridges near the basal angles and a transverse row of 2–4 tubercles about the middle. Male cerci obliquely ascending, as long as the supra-anal plate, thick, with blunt apex, convex on the outer side and concave from inside, with the lower margin obtusely bidentate. Male subgenital plate short, round. Subgenital plate of the female with two triangular emarginations at the apex.

Genotype: *Gryllus erythropus* Thunbg.

1. **Aneuryphymus erythropus** (Thunbg.).

(Plate I, figs. 16 and 17.)

1815. *G*[*ryllus*] *erythropus* Thunberg, Mém. Acad. Pétersb., v, p. 248.
1824. *G*[*ryllus*] *erythropus* Thunberg, l.c., ix, pp. 399, 426, no. 94.
1873. *C*[*alliptenus*] (*Euryphymus*) *erythropus* Stål, Rec. Orth., i, p. 73, no. 4.
1876. [*Euryphymus*] *erythropus* Stål, Öfver. K. Vetensk. Akad. Förhand., 3, p. 43.
1902. *E*[*uryphymus*] *erythropus* M. Fernandez, An. Soc. Esp. Hist. Nat., xxx, pp. 261, 268.
1910. *E*[*uryphymus*] *erythropus* Kirby, Syn. Cat. Orth., iii, p. 546, no. 13.

British Museum specimens: Knysna, 1 ♀; Pretoria (*W. L. Distant*), 4 ♂♂, 13 ♀♀.
Hope Museum specimens: Kimberley, Sanatorium grounds, 5 ix. 1905 (*G. L. Parson and E. B. Poulton,*) 3 ♀♀.

2. **Aneuryphymus rhodesianus,** sp. n.

(Plate I, fig. 18.)

♂. Very much like *A. erythropus*, but differing from it in the following characters: Shorter and broader, distinctly more rugose. Pronotum shorter, with the hind angle obtuse, rounded. Elytra scarcely reaching the hind knees. The last abdominal segment with an obtuse angular emargination and a small black tooth in the middle of the hind margin. Supra-anal plate with only one submedian pair of tubercles and another pair at the basal angles. Cerci about twice as long as they are broad, with two obtuse teeth on the lower margin, with the apex obtuse. Coloration of the same general type as in *A. erythropus*, but the elytra with smaller, scattered brownish spots, and the inner side of the hind femora red, only partly blackened along the upper carina.

♀ (paratype). Differs from *A. erythropus* in the same general characters as the male, and, besides, in the deeper and more narrow emarginated subgenital plate, the apex of which is acutangular.

	♂ (type)	♀ (paratype)
Length of body . .	19 mm.	25 mm.
,, ,, pronotum .	5	6·5
,, ,, elytra . .	13	15·5
,, ,, hind femora .	11	15

Type and paratype are in the Hope Department, University Museum, Oxford; they were both captured by Dr. G. A. K. Marshall, at Mahakata River, Gazaland, S.E. Rhodesia, about 5000 ft., 24 ix. 1905.

This new species is not yet represented in the British Museum, where, however, there is one more, probably undescribed, species from Barberton, which I abstain from describing from a single rather unsatisfactorily preserved male.

KEY TO THE SPECIES OF *ANEURYPHYMUS*.

1. (2) Head, pronotum, pleurae and hind femora distinctly rugose. Elytra scarcely reaching the hind knees. Hind angle of pronotum obtuse, rounded. Hind femora on the inner side red, only partly blackened along the upper margin. ♂. Last abdominal segment with an obtusangular emargination and a small black tooth in its middle; supra-anal plate with but two submedian tubercles; cerci less than twice as long

as broad, with the apex very obtuse. ♀. Subgenital plate deeply and acutely emarginated, with the apex acutangular.
A. rhodesianus Uvar.

2. (1) Head, pronotum, pleurae and hind femora less rugose. Elytra extending beyond the hind knees. Hind angle of pronotum straight, not rounded. Hind femora on the inner side black. ♂. Last abdominal segment with a round emargination, without a median tooth; supra-anal plate with two submedian tubercles and two short lateral carinulae; cerci about three times as long as broad, with the apex less obtuse. ♀. Subgenital plate more shallowly and broadly emarginated, with the apex more obtuse.
A. erythropus Thunb.

Genus Plegmapterus M. Fern.

This genus is undoubtedly very closely related to *Euryphymus*, from which it differs only by the obliterate keels of the pronotum; the male of its single species is, however, unknown and it prevents me from defining its relationship more precisely.

1. Plegmapterus irisus (Serv.).

1839. *Calliptamus irisus* Serville, Ins. Orth., p. 691, no. 6.
1870. *Caloptenus saturatus* Walker, Cat. Derm. Salt. B. M., iv, pp. 690, 692, no. 34.
1873. *C*[*alliptenus*] (*Euryphymus*) *ferruginosus* Stål, Rec. Orth., i, p. 72, no. 2.
1902. *P*[*legmapterus*] *ferruginosus* M. Fernandez, An. Soc. Esp. Hist. Nat., xxx, p. 259.
1902. *E*[*uryphymus*] *irisus* M. Fernandez, l.c., pp. 261, 266.
1910. *P*[*legmapterus*] *ferruginosus* Kirby, Syn. Cat. Orth., iii, p. 544, no. 1.
1910. *E*[*uryphymus*] *irisus* Kirby, l.c., p. 545, no. 8.
1910. *E*[*uryphymus*] *saturatus* Kirby, l.c., p. 546, no. 12.

The type of Walker's *C. saturatus* agrees with the description of *P. ferruginosus* Stål drawn by M. Fernandez from Stål's co-type, and there is no doubt that *C. irisus* Serv. is also conspecific with both.

British Museum specimen : Zoolu, 1 ♀ (*Walker's type of C. saturatus*).

PACHYPHYMUS, gen. nov.

Resembling a member of *Oedipodini* rather than *Calliptamini*.

Head strongly rugose. Face vertical; frontal ridge between the fastigium and median ocellum broad, parallel, convex, with the margins raised; below the ocellum suddenly narrowed, sulcate, still more narrowed towards the clypeus. Fastigium of vertex strongly sloping, somewhat concave, slightly broader than long, and distinctly broader than the frontal ridge between antennae; its margins raised and connected with the margins of the frontal ridge. Occiput with radial postocular ridges. Pronotum rugose, very much alike in its general shape to that of species of *Tmethis* of the group *T. gibber* St.; strongly compressed laterally, especially in prozona, which is distinctly shorter than the metazona; its upper surface strongly tectiform, with median keel crested, in prozona dissected in two teeth, in metazona strongly convex and as high as in prozona; hind angle acute; its lateral margins concave. Lateral lobes of the pronotum distinctly higher than long, impressed before the middle; fore margin S-shaped; fore angle obtuse, rounded; lower margin with a very obtuse and broadly rounded angle before the middle; hind angle a little more than 90°, widely rounded; hind margin slightly convex, oblique. Prosternal tubercle with the base very broad, low (scarcely higher than broad), slightly transverse, thick, with the apex very obtuse. Mesosternal lobes twice as broad as they are long; their interspace subequal to one of them. Metasternal interspace one half again as broad as long. Elytra coriaceous, scarcely transparent even in the apical half. Wings strongly infumate, with the inner disc coloured. Hind femora rather narrow, gradually narrowed apically; upper keel in the basal half strongly convex. Hind tibiae with 7 outer and 9 inner spines; no outer subapical spine; all spurs very feebly bent; the inner spurs scarcely longer than the outer ones.

Genotype: *Calliptamus cristulifer* Serv.

C. cristulifer is such a striking insect that it undoubtedly represents a genus distinct from any one known hitherto, and somewhat related, probably, to *Acorypha* Krauss and *Acoryphella* G.-Tos. Its proper systematic position cannot be defined until the male is known.

1. **Pachyphymus cristulifer** (Serv.).

1839. *Calliptamus cristulifer* Serville, Ins. Orth., p. 692, no. 8.

1870. *Caloptenus cristulifer*, var. ?, Walker, Cat. Derm. Salt. B. M., iv, p. 691, no. 30.
1902. *E*[*uryphymus*] *cristulifer* M. Fernandez, An. Soc. Esp. Hist. Nat., xxx, pp. 261, 272.
1910. *Caloptenus cristulifer*, var (?), Kirby, Syn. Cat. Orth., iii, p. 245.
1910. *A*[*crotylus*] *cristulifer* Kirby, l.c., p. 264, no. 4.

Serville's and Walker's descriptions of the coloration of this species, together with the above generic description, are quite sufficient to identify the species, and I think it superfluous to give its re-description.

British Museum specimen : S. Africa, 1 ♀.

Species of Calliptamini, *the generic position of which is not certain.*

There is a number of species described by different authors under *Caloptenus* and *Euryphymus*, the correct generic position of which cannot be determined by the descriptions only, and might be cleared up by the study of the types, in the cases where these are available. Unfortunately, many of Walker's types which were in Mr. Lord's collection in Egypt are destroyed, and there is scarcely any hope of clearing up some of his species.

The following species are described by Walker in the Cat. Derm. Salt. B. M., iv, 1870 :—

Caloptenus testaceus (l.c., p. 685, no. 22).—Possibly a *Kripa*.
,, *concisus* (l.c., p. 687, no. 25).—A *Caloptenopsis* ?.
,, *signatus* (l.c., p. 687, no. 26).—A *Caloptenopsis* ?.
,, *turbidus* (l.c., p. 688, no. 27).—Possibly a *Thisoecetrus*.
,, *mutator* (l.c., p. 689, no. 28).—Possibly a *Thisoecetrus*.
,, *cincticollis* (l.c., p. 689, no. 29).—This is a member of *Euprepocnemini* and conspecific with *Acridium morbosum* Serv., but the genus is uncertain, the male being unknown.*

* See my note in the Journ. Bombay Nat. Hist. Soc., 1921 (in print).

Caloptenus reductus (l.c., p. 713, no. 74).—Hardly belongs to *Calliptamini*.

Several species of Bolivar also cannot be placed in proper genera without an examination of the types; they are as follows :—

Caloptenus nigro-punctatus (Journ. Sci. Lisboa, viii, p. 114, no. 29, 1881).—According to Bolivar (Mem. Soc. Ent. Belg., xxx, 1911, p. 95), belongs to the genus *Cardenius*.

Euryphymus brachypterus (l.c., seg. ser., i, p. 167, no. 166, 1889).—Belongs probably to a new genus close to *Platyphymus*.

Caloptenus obesus (l.c., p. 170, no. 171).—Probably a new genus.

,, *cicatricosus* (l.c., p. 170, no. 172).

One of M. Fernandez' species, described by the female only is also difficult to identify :—

Euryphymus capensis (Actas Soc. Esp. Hist. Nat., ser. ii, t. v. p. 11, 1898; An. Soc. Esp. Hist. Nat., xxx, p. 268, 1902).

Giglio-Tos, also, described one species of *Euryphymus* by the female sex only, and the genus remains unknown :

Euryphymus nodulus (Boll. Mus. Torino, xxii (554), p. 26, 1907).

ALPHABETICAL INDEX.

All names printed in italics are synonyms. All new genera and species described in this paper are marked with an asterisk.

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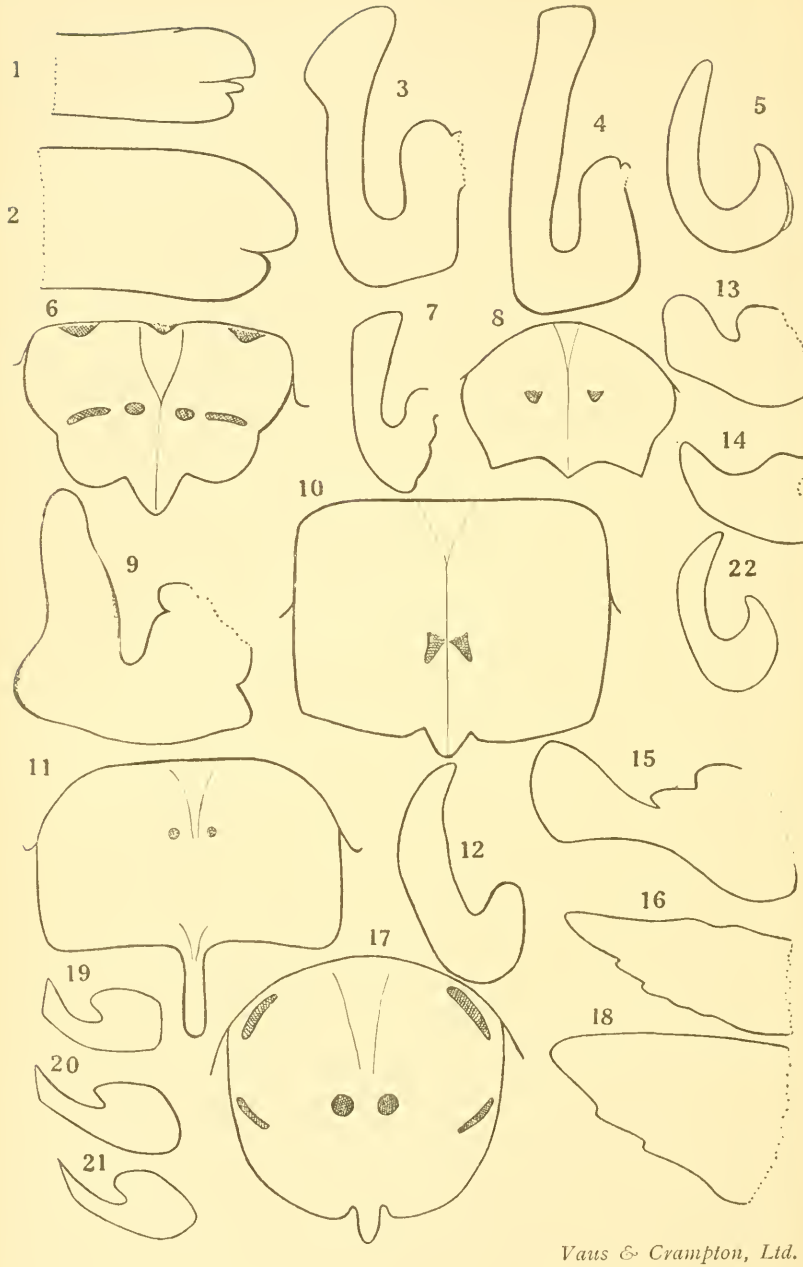

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MALE GENITALIA OF CALLIPTAMINI.

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Explanation of Plate I.

Fig. 1. *Calliptamus italicus* L., tip of the cercus.
2. *Kripa coelesyriensis* Gig.-Tos, tip of the cercus.
3. *Amblyphymus miniatus*, g. and sp. n., cercus.
4. *Rhachitopsis ceraseus*, g. and sp. n., cercus.
5. *Platyphymus granulatus*, g. and sp. n.,cercus.
6. ,, ,, ,, supra-anal plate.
7. *Calliptamicus semiroseus* Serv., cercus.
8. ,, ,, ,, supra-anal plate.
9. *Platacanthoides bituberculatus*, sp. n., cercus.
10. ,, ,, ,, supra-anal plate.
11. *Martinezia fernandezi*, g. and sp. n., supra-anal plate.
12. ,, ,, ,, cercus.
13. *Euryphymus haematopus* L., cercus.
14. ,, *tuberculatus* Mart., cercus.
15. *Acrophymus squamipennis* Brancs., cercus.
16. *Aneuryphymus erythropus* Thunbg., cercus.
17. ,, ,, ,, supra-anal plate.
18. ,, *rhodesianus*, g. and sp. n., cercus.
19. *Calliptamulus roseipennis*, g. and sp. n., cercus.
20. ,, *sulfurescens*, g. and sp. n., cercus.
21. ,, *hyalinus*, g. and sp. n., cercus.
22. *Brachyphymus sulfurens*, g. and sp. n., cercus.

All figures are drawn by the Zeiss camera-lucida, about fifteen times the natural size.

V. *Two new British species of* Hydroptila. By Martin E. Mosely, F.E.S.

[Read February 1st, 1922.]

Plate II.

In a paper read before this Society in October 1919, I mentioned that there were in my collection two undescribed British species of *Hydroptila*. At the time, lack of material precluded the exhaustive examination of the scent-organs which now seems necessary for the satisfactory separation of the four species which are grouped round and which very closely resemble *H. sparsa* Curt.

Last season I was successful in finding three or four more examples of each of these new species, and with Dr. H. Eltringham's kind assistance have ascertained that the scent-organs furnish abundant characters to prove that they are distinct.

H. cornuta has no eversible filament at all, and the scent-organ is reduced to the simplest form so far seen in *Hydroptila*. It resembles *sparsa* in the shape of the lobe and also in the marginal outline of the dorsal plate, but the inferior appendages bear a closer resemblance to those of *simulans*.

H. angulata closely resembles *H. simulans* in the shape of the dorsal plate and the arrangement of the scent-organ. Dr. Eltringham, however, has ascertained that the scent-hairs of the brushes are much finer and apparently have no external structure. A marked difference is shown in the shape of the lobe or scent-organ cap.

It may be of interest to mention here, that *H. simulans* has been found very plentifully in Hampshire; along some stretches of the R. Test it may be said to be the prevailing *Hydroptila* species for a considerable portion of the summer and autumn. I have now obtained some hundreds of examples from this district. I have also taken it on the R. Avon at Ringwood, the R. Torridge at Sheepwash in N. Devon, the R. Thames at Hampton Court, and Dr. Georg Ulmer writes that he has found it in his collection mixed with examples of *sparsa* from Thüringen.

H. angulata and *H. cornuta* seem comparatively rare. Of *angulata* I have three examples from the Lambourne, in

Berkshire; one from the Usk at Senny Bridge, Breconshire; five or six from the R. Torridge at Sheepwash; and Mr. K. J. Morton has some examples which were taken, I believe, towards the west coast of Ireland.

Of *cornuta*, I have three examples from the Test; one from the Thames at Hampton Court, and on examining the collection at the Natural History Museum, found mixed with *sparsa*, five or six examples collected by the Rev. A. E. Eaton at Ringwood, on the R. Avon. A visit to this district failed to discover any more.

Basing the sequence on the scent-organ characters, one would be inclined to arrange this little group in the order *cornuta*, *sparsa*, *angulata* and *simulans*.

Hydroptila cornuta, n. sp.

Description of the ♂.

Expanse 7½ mm. Antennae about 31-jointed, the head furnished with lobes shaped as in *sparsa*.

The scent-organs are much simplified in form and appear to consist merely of two groups of scent-hairs arising from the membranes which line the inner surface of each lobe.

The dorsal plate resembles that of *sparsa*, but the extreme angles of the plate are produced to form slight spurs. Towards the base of the plate there are well-marked projections on each side. The two side processes arising from the 9th segment are longer and more slender than those found amongst other members of the group. The penis is as usual bent round at right angles towards the apex. The inferior appendages resemble those of *simulans*, but the dark warts towards the extremities develop into claw-like spurs.

The ventral plate is deeply excavated in the centre of the upper margin.

H. angulata, n. sp.

Description of the ♂.

Expanse 6½ mm. Antennae about 32-jointed.

The scent-organs closely resemble those of *simulans*, with the slight variations mentioned above. The lobe differs considerably. In *simulans* it is acorn-shaped with the acorn portion much longer than the cup. In *angulata* the areas of the acorn and cup are about equal and the length and breadth of the lobe are approximately the same.

The margin of the dorsal plate is difficult to make out. It closely resembles that of *simulans*, but the extreme angles of the

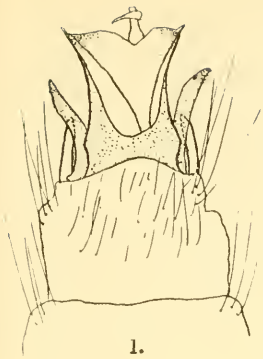
plate are more rounded and the excision is perhaps a little narrower. The penis and the side-pieces of the 9th segment are as in *sparsa* and *simulans*. The inferior appendages have large, flattened extremities turned outward at a sharp angle to the main stem and terminate in dark, roughened edges.

The upper margin of the ventral plate has a shallow excision and appears far more strongly chitinised than the rest of the plate.

Both species are described from examples in Canada balsam and the different aspects are drawn from different examples.

Explanation of Plate II.

Fig. 1. *Hydroptila cornuta* ♂. Genitalia from above.
2. ,, ,, ,, ,, beneath.
3. ,, ,, ,, ,, the side.
4. ,, *angulata*. ,, ,, ,,
5. ,, ,, ,, ,, beneath.
6. ,, ,, Lobe of the head.



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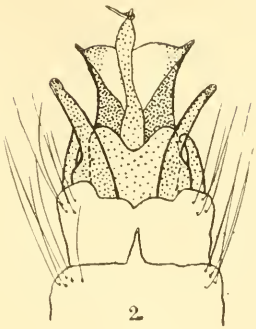

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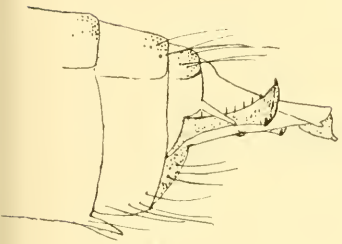

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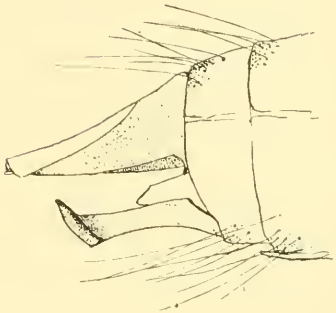

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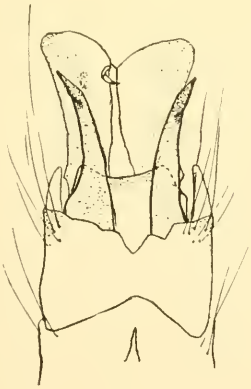

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M. E. Mosely, del. *Vaus & Crampton, Ltd.*

GENITALIA OF H. CORNUTA and H. ANGULATA.

VI. *On New Genera and Species of Neotropical Curculionidae.*

By Guy A. K. Marshall, C.M.G., D.Sc.

[Read March 1st, 1922.]

Plates III, IV.

Lacordaire long ago pointed out (Gen. Col. vi, pp. 114, 115) that the genus *Cyphus* Germ., as defined by himself, was a composite one and would need subdivision; and although three or four species have since been removed from it, the name is still generally used in an erroneous sense.

Germar (Ins. Spec. Nov. 1824, p. 429) divided his genus into three sections, the first of which he called "Genuini," and this must therefore be regarded as the typical group. In it he included the following new species: *argillaceus* (a synonym of *gibber* Pall.), *inhalatus*, *chlorostomus*, *litus* (transferred by Schönherr to *Pachnaeus*), and *albiceris* (the genotype of *Hadropus* Schh.).

Schönherr (Disp. Meth. 1826, p. 108) included the first two of these species in his Stirps 1 of *Cyphus* and cited *gibber* as the type of the group, and this species must therefore be accepted as the genotype of *Cyphus*. This insect is clearly not congeneric with the brilliant species with which its generic name has unfortunately become associated, and the species of *Cyphus* cited in the Munich Catalogue will now have to be allocated to six different genera, which are defined in the following key.

1. (4) Mentum without setae; stria 10 on the elytra broadly interrupted in the middle for nearly half its length; metepimeron not exposed.
2. (3) Antennae very slender, the scape exceeding the eye; the corbel of the hind tibiae not ascending the dorsal edge of the tibia; joint 2 of the tarsi as long as broad; mesepisternum touching the elytron; genotype *bituberosus* Gyl. . . . . *Stenocyphus*, g. n.
3. (2) Antennae stout, the scape not exceeding the eye; the corbel of the hind tibiae markedly ascending, its dorsal row of bristles being much longer than the apical one; joint 2 of the tarsi strongly transverse; mesepisternum

widely separated from the elytron; genotype *hancocki* Kirby . . . . . *Ericydeus* Pasc. (1880).

4. (1) Mentum setose; stria 10 complete.
5. (6) Scape of antennae exceeding the eye; the corbel of the hind tibiae ascending the dorsal edge of the tibia; elytra with irregular accessory rows of punctures; mentum with a transverse row of four setae along the anterior edge; metepimeron exposed, squamose; genotype *gibber* Pall. . . . . *Cyphus* Germ. (1824).
6. (5) Scape of antennae not exceeding the eye; corbels of hind tibiae not ascending; mentum plurisetose.
7. (8) Longitudinal outline of pronotum very convex, the basal margin on a much lower level than the apical; scrobe curving so abruptly downwards that the direction of the lower part is almost perpendicular to that of the anterior portion; apical area of the rostrum separated off by a transverse carina; metepimeron not exposed; genotype *myrmosarius* Perty . . *Trichaptus* Pasc. (1880).
8. (7) Longitudinal outline of pronotum nearly or quite flat; scrobe gently curved; rostrum without a transverse carina.
9. (10) Rostrum with the lateral margin of the dorsum carinate and with an ante-ocular impression below the carina; elytra with a posterior callus; joint 2 of the tarsi strongly transverse; metepimeron distinct, squamose; genotype *augustus* Ill. . . . . *Lamprocyphus*, g. n.
10. (9) Rostrum not carinate laterally and with no ante-ocular impression; elytra without a posterior callus; joint 2 of the tarsi as long as or longer than broad; metepimeron concealed; genotype *juvencus* Oliv. *Germariella* Champ. (1911).

The species assigned to the various genera are set forth in the following list.

Stenocyphus, g. n.
bituberosus Gyl.

Ericydeus Pasc.
forreri Champ.
hancocki Kby.
lautus Lec.
modestus Gyl.
nigropunctatus Chev.
placidus Horn.
quadripunctatus Champ.
rosciventris Champ.
schönherri Perty.
sedecimpunctatus L.
viridans Boh.
yucatanus Champ.

Trichaptus Pasc.
myrmosarius Perty.

Cyphus Germ.
chevrolati Boh.
gibber Pall.
glaucus Bovie.
inhalatus Germ.
luridus Boh.
pistor Boh.

Lamprocyphus, g. n.
augustus Ill.
consularis Chev.
elegans Roel.
germari Boh.
margaritaceus Sturm.
olivierae Roel.
spixi Perty.
varnhageni Germ.

Germariella Champ.
chlorostomus Boh. (?)
juvencus Oliv.
pudens Boh.
suturalis Fst.

Cyphus cyanipes F. and *C. gentilis* Oliv. belong to the genus *Compsus*; but *C. chrysis* F. I am unable to place, for I know of no insect that resembles Olivier's distinctive figure of the species; it seems very doubtful whether the insect really came from the East Indies, as indicated by Fabricius, and I should prefer to refer it provisionally to the genus *Compsus*. *C. bispinus* Boh. and *C. lugubris* Boh. are more nearly related to *Naupactus*, and the genus *Canephorus* has already been erected for their reception by Kirsch (1889). *C. effusus* Pasc. and *C. sigillatus* Pasc. (1880) are referable to the genus *Pseudocyphus* Schaeff. (1905). Finally, *C. mucoreus* Kirsch (1889), from Peru, appears to belong to the genus described below under the name of *Xestogaster*, g. n., judging by its elongate form, shiny black underside and tuberculate mesosternum.

Genus Stenocyphus, nov.

Head not constricted behind the eyes. *Rostrum* with the lateral edge of the dorsal area rounded off and without an ante-ocular depression; the scrobes very narrow, deep and parallel-sided; the mentum bare. *Antennae* very slender; the scape clavate and exceeding the eye. *Prothorax* with the bisinuate basal margin depressed and fitting beneath the base of the elytra. *Scutellum* small, but distinct. *Elytra* narrower at the shoulders than in the immediately allied genera, the basal margins strongly lobate and overhanging; stria 10 broadly interrupted in the middle. *Legs* rather slender; the corbels of the hind tibiae bare (except for a single row of scales along the apical margin), not ascending the tibiae; joint 2 of the tarsi as long as or longer than broad. *Sternum* with the mesepisterna meeting the elytra; the metasternum with the

antecoxal fold much reduced, and the metepimeron almost completely concealed.

Genotype, *Cyphus bituberosus* Gyl.

Genus Lamprocyphus, nov.

Head shallowly constricted behind the eyes. *Rostrum* with the edge of the dorsal area carinate and with a distinct ante-ocular impression; the scrobes broad, evenly curved and gradually widening behind; the mentum plurisetose. *Antennae* stout; the scape strongly clavate, not exceeding the hind margin of the eye, setose, and without scaling. *Prothorax* with the strongly bisinuate basal margin deeply and almost vertically truncate. *Elytra* with the shoulders angularly prominent and there twice as broad as the base of the prothorax; stria 10 complete; the posterior callus well developed. *Legs* stout; the front tibiae angulate internally at the apex, but without a true mucro; the corbels of the hind pair bare (but sometimes with a single row of scales along the apical margin) and not ascending the tibiae; joint 2 of the tarsi strongly transverse. *Sternum* with the mesepisternum well separated from the elytra; the metepimeron exposed and densely squamose.

Genotype, *Cyphus augustus* Illig.

Cyphus elegans Roel. (1880) is a rather aberrant species, having joint 2 of the tarsi as long as or longer than broad, and the mesepimeron concealed; I am indebted to Mr. A. Bovie, of Brussels, for the opportunity of examining a cotype of this species.

Genus Germariella Champ.

Germariella Champion, Biol. Centr.-Amer. iv, pt. 3, 1911, p. 234.

Leptostylus Faust (*nec* Leconte, 1852), Stett. Ent. Zeit. liii, 1892, p. 8 (new syn.).

Faust's genus is homotypic with Champion's. I am not acquainted with *Cyphus chlorostomus* Boh., which is provisionally referred to this genus.

Germariella bovelli, sp. n.

♂♀. Integument black or piceous, fairly closely covered with pale grey scales and dusted with yellow powder; legs red-brown.

Head with sparse fine shallow punctation and with narrow scales, which are thin on the disk and dense round the eyes; the forehead

almost parallel-sided, with a deep median furrow continuous with that on the rostrum. *Rostrum* as long as broad, parallel-sided, with a deep median furrow in the basal half only and a shallow longitudinal impression on each side; the interantennal area almost flat transversely. *Prothorax* transverse, broadest at the base, gradually narrowed to the apex, with the sides gently rounded; the disk slightly flattened in the middle, with a shallow median furrow almost reaching the apex and much deeper at the base; the median furrow containing a narrow stripe of ovate scales, and a very dense lateral stripe on each side of similar scales, the intervening space thinly clothed with very narrow elongate scales, lying transversely and sometimes intermingled with a few broad ones; the setae erect at the sides, but recumbent on the disk. *Elytra* shaped as in *G. pudens* Boh., the basal margins moderately rounded; the striae shallow, with large round separated punctures, the intervals not broader than the striae; the scales short ovate or circular, not very dense, those on the basal half of intervals 1 to 3 or 4 much narrower, more or less setiform; the numerous shorter setae strongly curved or subrecumbent, the longer ones more raised and suberect towards the sides and apex.

Length, 7·5–9 mm.; breadth, 3·5–4 mm.

Barbados (*J. Bovell*).

Described from four specimens taken on *Chrysobalanus icaco.*

This species is very closely allied to *G. pudens* Boh., which differs as follows:—The scales on the head are circular; the lateral impressions on the rostrum are much deeper; the prothorax is more narrowed in front, not flattened on the disk and covered throughout with circular scales, the median furrow is confined to the basal half or obsolete, and the setae on the disk are quite erect; on the elytra the intervals are broader than the striae and covered right up to the suture with circular scales, all the setae being erect.

Genus Pseudocyphus Schaeff. (1905).

This genus includes those forms of *Platyomus* which in many collections stand under the MS. name of *Metriomus* Jekel.

Pseudocyphus marmoratus, sp. n. (Plate III, fig. 5.)

♂♀. Integument black, variegated with grey, black and brown scaling. Typical colouring:—The head fawn-coloured, with a few

dark scales on the vertex; the pronotum with two pear-shaped fawn markings outlined in black, the narrow ends meeting at the apex, the broad ends diverging behind; the elytra with three deeply denticulate fasciae of fawn scales outlined with black or very dark brown (see figure): the first starting at the base between striae 1 and 5 and running obliquely just behind the shoulder down to the lateral margin; the second forming a broad common transverse band just behind the middle, its outer portion curving forwards and uniting broadly with the first fascia on the lateral margin—these two bands enclosing an irregular cross-like area of the grey ground-colour; the third forms a common subapical dentate band, which is narrowly produced along the suture and also along the lateral margin to the apex; the lower surface with whitish scaling irregularly tinged with buff; the legs anteriorly fawn-coloured, the posterior pairs of femora becoming much paler on the apical half, the entire leg being whitish on the posterior face. In some forms the fawn markings become almost entirely blackish and the ground-colour white; in others the ground-colour is more or less invaded by fawn scaling; in others, again, the fawn is entirely replaced by the grey ground-colour, the bands being merely indicated by separated black flecks, which are all that remains of the black borders (var. *obsoletus*, nov.).

Head very broad, not constricted behind the eyes, which are almost circular; the forehead with a fine median stria continuous with and similar to that on the rostrum. *Rostrum* broader than long, much narrowed from base to apex, the sides straight; the dorsum with a broad deep impression in the basal half containing a median stria and bounded on each side by a short carina that is parallel with its fellow; the anterior part shallowly impressed in ♀, much more deeply so in ♂; the setae short, scale-like and recumbent. *Antennae* with the scape reaching the hind margin of the eye, stout, curved, hardly compressed, gradually widening from base to apex and with short recumbent setae; the funicle with joint 2 much longer than 1, 3 not or but little shorter than 1, 4 slightly shorter than 3, the rest much shorter and about as long as broad. *Prothorax* much broader than long, a little narrower at the apex than at the base, the sides gently rounded, broadest before the middle, with a distinct apical constriction, and the apical dorsal margin rounded; the dorsum with a broad deep transverse impression occupying the whole of the basal fourth, the remainder shallowly rugose, but the sculpture almost entirely hidden by the scaling. *Elytra* broadly ovate, the basal lobes very prominent, the shoulders roundly rectangular and followed by a slight sinuation, the apices jointly rounded; the shallow striae quite regular and with small

deep separated punctures, stria 9 being markedly deeper than the others; the intervals gently convex and all of equal height and even, with a well-marked transverse impression on each side before the apex; the scales broadly ovate or subcircular and overlapping, the setae short, flattened and recumbent.

Length, 7–12 mm.; breadth, 3–5·5 mm.

Brazil: Obydos (type). British Guiana.

Described from twenty-one specimens.

This species is easily recognisable by its very characteristic pattern from its nearest allies *Ps.* (*Cyphus*) *effusus* Pasc. and *Ps.* (*Platyomus*) *atrosignatus* Lucas (of which *Cyphus sigillatus* Pasc. is a synonym), and in conjunction with the next species they form a small group presenting the following characters:—Head very broad, forehead steeply sloping; rostrum short and much narrowed to the apex; prothorax with a broad transverse depression occupying the posterior fourth.

I have retained for this species Dejean's manuscript name, which has been generally applied to it in collections.

Pseudocyphus sellatus, sp. n. (Plate III, fig. 9.)

♂♀. Integument black, with dense creamy-white scaling, which is tinged with buff on the forehead, rostrum, antennae and the apical half of the tibiae; the elytra with a common broad dentate brown band behind the middle, extending on each side as far as stria 8, its anterior margin almost on a level transversely on intervals 4, 6, 7, 8, projecting slightly forwards on 3 and 5, and deeply indented on 1 and 2— the hind margin nearly level on ints. 2, 3, 4, 6, shallowly indented on 5, 7, 8, and projecting backwards along the suture; a small brown spot near the base on int. 4, which is sometimes produced obliquely backwards on to 5, another a little further from the base on the suture, and a narrow sinuous transverse brown line between striae 3 and 9 just above the posterior callus.

The structural characters are almost identical with those in *Ps. marmoratus*, sp. n., except in the following particulars:—The basal impression on the prothorax is deeper, the anterior part being more strongly wrinkled laterally, so that the wrinkles are clearly visible through the scaling; the elytra have the shoulders more prominent laterally; and the 7th tergite in the ♂ is broadly truncate at the apex, whereas in *Ps. marmoratus* it is evenly curved.

Length, 9–10·5 mm.; breadth, 4–5 mm.

Brazil: Bahia.

Described from three specimens.

In these two species the median lobe of the male aedoeagus consists of the usual curved chitinised tube, the apical spatula, comprising one-fourth of the length, being a simple trough-like projection ending in a fairly sharp point; the struts are five-sixths the length of the tube, hinged at the point of attachment, and rather slender. The uneverted sac projects backwards for nearly twice the length of the struts, being a long slender tube with some minute asperities in the terminal fourth, but without any distinct transfer apparatus. The tegmen has a complete ring, with two narrow dorsal lobes, which are united for half their length, and the stalk is more than twice as long as the

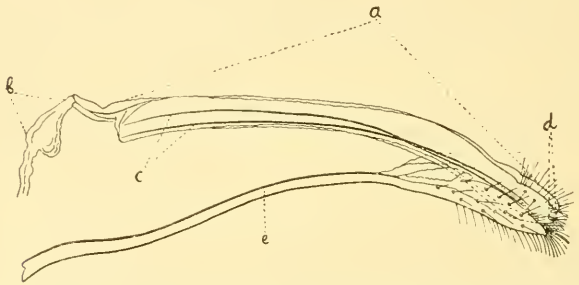

Fig. 1.—Female genitalia of *Pseudocyphus sellatus*, sp. n., lateral view: *a*, vagina; *b*, bursa copulatrix; *c*, chitinous rods in walls of vagina; *d*, vaginal palps; *e*, strut of 8th ventrite.

lobes. Ventrite 8 consists of two separate subtriangular plates.

In the ♀ the vagina (fig. 1) is a very long, lightly chitinised tube (in one specimen of *Ps. sellatus* it measures 5 mm.), containing two fine chitinous rods that reach from the base almost to the apex; the terminal palps are reduced to two minute granules, their tactile function being apparently usurped by a number of hairs scattered over the apex of the vagina, and also by the still more numerous hairs at the tip of the attached 8th ventrite; the latter has a very long slender strut, the two together measuring 6 mm. in the specimen referred to. The bursa is proportionately very small, being a simple membranous sac. The membrane enveloping the vagina is nowhere chitinised. The spermatheca as figured (fig. 2, *e*).

Genus Exophthalmodes Pierce (1917).

The name *Exophthalmodes* was proposed by Mr. Pierce for *Exophthalmus* Schh., because the latter name had been preoccupied by Latreille; but he goes on to state that Schönherr's genotype *quadrivittatus* Oliv. cannot be accepted, because it has postocular vibrissae on the prothorax and therefore belongs to the genus *Diaprepes*

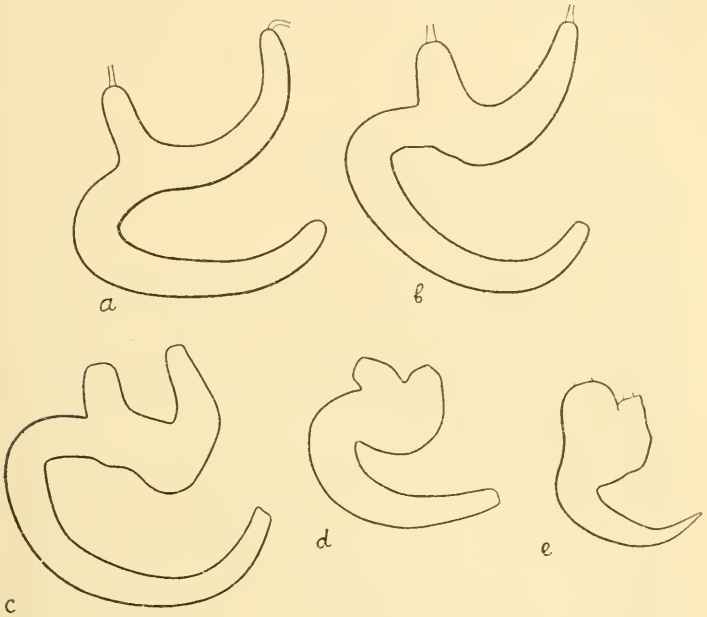

Fig. 2.—Spermatheca of females of: (*a*) *Exophthalmodes parentheticus*, sp. n.; (*b*) *E. consobrinus*, sp. n.; (*c*) *E. crassicornis* Kirsch; (*d*) *Exorides wagneri* Har.; (*e*) *Pseudocyphus sellatus*, sp. n.

Schh., and he consequently selects a new genotype, *opulentus* Boh. This selection is unfortunate, because *opulentus* was never included in *Exophthalmus* by Schönherr, but was erroneously placed in his genus *Eustales*. However, the validity of the citation does not arise, because the primary statement with regard to *quadrivittatus* Oliv. is incorrect; for this species does *not* possess prothoracic vibrissae, and being a true *Exophthalmodes* should be retained as the type of that genus. I can have little doubt

that the error has arisen from the fact that Mr. Pierce must have had before him not *quadrivittatus*, but *sommeri* Rosen., a true *Diaprepes* that has an extraordinary superficial resemblance to it.

The attempt to discriminate *Diaprepes* from *Exophthalmodes* by means of the prothoracic vibrissae is not satisfactory, because these setae are very variable in development and in some species are very difficult to detect. There is a much better character in the antennal funicle, the second joint being much longer than the first in *Diaprepes* and about equal to it in *Exophthalmodes*.

Exophthalmodes consobrinus, sp. n. (Plate III, fig. 10.)

♂♀. Integument black, covered densely beneath and much more sparsely above with glistening blue-green scales; the prothorax with two denser dorsal stripes of similar scaling, which are usually continued on the head along the inner edge of the eyes to the apex of the rostrum; the elytra with a broad ring round the shoulder formed of pale greenish white scales dusted with yellow powdering, and a broad, slightly curved, transverse band of similar scales across the top of the declivity, both these markings coalescing laterally with a pale marginal stripe; the prosternum greenish white with yellow powdering; the legs with fairly dense green scaling, the femora with bare black dots round the setae.

Head with sparse shallow punctures and a deep frontal fovea. *Rostrum* nearly as long as the pronotum, parallel-sided in the basal half, thence dilated to the apex; a broad bare median stripe, which is very shiny and sparsely and minutely punctate, and on each side a short deep sulcus; the interantennal area rather steeply declivous and broadly excavated; the genae with a very deep, strongly curved furrow which extends right up to the lower angle of the eye. *Antennae* with fairly dense, narrow, pale green scales, sometimes mingled with blackish ones; the scape extending beyond the eye, gradually thickened at the apex, set with short blackish setae which are erect on the lower anterior face and recumbent elsewhere; the joints of the funicle in order of length: (1, 2), 3, 4, (5, 6, 7). *Prothorax* a little broader than long, subparallel-sided from the base to the middle, then roundly narrowed to the apex; the basal margin shallowly bisinuate, the apex truncate; the dorsum very shiny, with fine shallow punctures each containing a scale, and a few larger scattered punctures (from 15 to 20) in the median area between the two stripes, the lateral areas beyond the stripes being closely set with coarse punctures. *Scutellum* trapezoidal, a little longer

than broad, densely squamose. *Elytra* ovate, much broader in ♀, the shoulders moderately prominent and rounded, the sides subparallel to the middle in ♂ and beyond it in ♀, the apices separately pointed; the punctures large and deep as far as the posterior band, much smaller and substriate beyond it; the intervals finely alutaceous, with very minute sparse recumbent brown setae (much smaller than the scales) on the dark areas and with much larger stout dense setae on the pale bands. *Legs* with short recumbent pale setae, those on the lower surface of the femora and tibiae being rather longer and raised; the tibiae with a very shallow furrow on the basal third of the inner face.

Length, 15–19·5 mm.; breadth, 6–8·5 mm.

Colombia: Andagoya, R. Condoto, Choco (*Dr. H. G. F. Spurrell*—type); Buenaventura (*Rosenberg*).

Described from five specimens. The Buenaventura examples have the bands somewhat narrower than the others.

Closely allied to *E. crassicornis* Kirsch (1867), but in that species (Plate III, fig. 11) the elytra have no definite pale margin, the posterior sector of the circum-humeral ring has a marked angular projection on its posterior margin on interval 4, and the post-median band is strongly bisinuate and shortly produced backwards on the suture; the lateral furrows on the rostrum are shorter; the scape is thicker and bears much more numerous black setae; the median area of the pronotum bears numerous coarse punctures, and the lateral areas are more rugose. The aedoeagus of the ♂ is extremely similar in the two species, except in the dorsal lobes of the tegmen, which are narrow and widely separated in *consobrinus*, and broadly triangular and contiguous in *crassicornis*; the sac is contained entirely within the strongly chitinised cylindrical curved median lobe. The spermatheca of the ♀ is differently shaped in the two species (fig. 2, *b*, *c*).

Exophthalmodes parentheticus, sp. n. (Plate III, fig. 12.)

♂♀. Integument black, thinly clothed with greyish green scales above and with much denser greenish white scaling beneath; the pronotum with two pale dorsal stripes; the elytra with a greenish white sutural stripe from the basal margin to a little behind the scutellum, then turning sharply outwards to form a straight oblique band, the apex of which reaches stria 6 well before the middle, and subtending with its fellow an angle of about 100°; a similar reversed

marking behind the middle, the apex of the angle being on the suture at the top of the declivity; the legs as in *E. consobrinus*.

In general form and structure this species is also closely related to *E. crassicornis* Kirsch, but the scape of the antennae is more slender and less compressed; the larger punctures on the pronotum are equally numerous, but distinctly less coarse; the punctures on the elytra are more quadrate, more narrowly separated and consequently more numerous, those in stria 1 between the two bands numbering 12–15 in the ♂ (*crassicornis*, 8–9) and 15–17 in the ♀ (*crassicornis*, 10–11); and the spermatheca of the ♀ differs in shape (fig. 2, *a*).

Length, 15–20 mm.; breadth, 6·5–9 mm.

Ecuador: S. Javier (type); Paramba, 3500 ft. (*Rosenberg*); Lita, 3000 ft. (*Rosenberg*).

Described from twenty-two specimens.

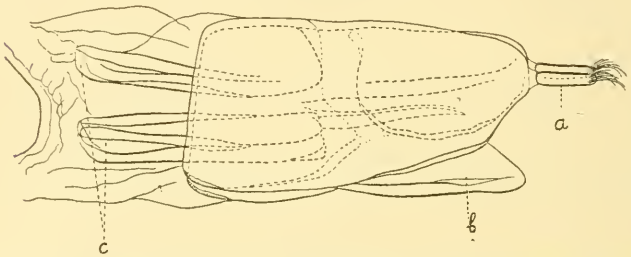

Fig. 3.—Female genitalia of *Exophthalmodes parentheticus*, sp. n., lateral view: *a*, vaginal palps; *b*, membranous lamina; *c*, chitinous strips in walls of vagina.

In all these species of *Exophthalmodes* the vagina of the ♀ is strongly compressed laterally, from 3·5 to 4 mm. long, and strengthened by several chitinous strips in its walls ("Seitenstücke" of Stein), being further supported in oviposition by the enveloping membrane, which is strongly chitinised on the appressed sides for from two-thirds to four-fifths the length of the vagina; and, as is often the case, this chitinous envelope is divided transversely about the middle by a transparent bar (fig. 3). In the apical half of the envelope on its ventral side is a membranous lamina (with only its lower edge chitinised) which can be slightly exserted downwards from between the two chitinous plates, like the partly-opened blade of a pocket-knife. The terminal palps are well developed, being 0·36 mm. long, with a number of hairs at the tip.

Genus Compsus Schh. (1826).

It may be well to note here that the following species described by Pascoe (1880) in the genus *Eustales* must be referred to *Compsus* :—*E. sejunctus* (apparently very near *C. alternans* Kirsch), *E. comtes* (very near *C. adamantinus* Kirsch) and *E. coruscus*.

Compsus armatissimus, sp. n. (Plate III, fig. 4.)

♂♀. Integument black, densely and uniformly covered with creamy white or pale buff scaling (usually with a slight brassy or coppery reflexion), except the tips of the tubercles on the elytra, which bear brown scaling, and two narrow undulating dorsal brown stripes on the pronotum, which are continued on to the head behind each eye.

Head shallowly constricted behind the eyes, the forehead slightly tumid on each side and with a very deep median fovea, which is connected with the rostral furrow. *Rostrum* as long as its apical width, strongly dilated from base to apex; the basal half with a broad shallow median furrow, which widens out anteriorly into a broad triangular impressed space, the apical area being very abruptly and steeply declivous and deeply excavate; the epistome steeply sloping, bare, and without any limiting carina; in the basal half on each side a deep impression in front of each eye and a longer oblique one beyond that, the scales in this area being very densely packed and suberect; rather long stout recumbent or subrecumbent setae along the lateral ridges. *Antennae* with the scape slightly exceeding the eye, thick, gradually and regularly widening from base to apex, densely clothed with overlapping and suberect scales, and set with stout obliquely raised setae; the funicle with joint 1 slightly shorter than 2, 3 longer than 4, and 4–7 subequal and a little longer than broad; the club a little longer than the three preceding joints, dark brown. *Prothorax* as long or nearly as long as broad, subcylindrical, but somewhat narrowed in the apical third; the lateral margins (as seen from above) irregularly sinuous; the gular margin shallowly sinuate; the dorsum coarsely plicate, the median area flattened and bounded on each side by a low sinuous ridge, the lateral area on each side about as broad as the median one; the scales rather shiny, flat and broadly overlapping; the lateral areas with scattered stout subrecumbent setae, but hardly any on the median area. *Scutellum* pear-shaped, narrowed in front, covered with dense erect narrow scales. *Elytra* oblong-ovate, with a humeral tubercle but without true shoulders, the apices pro-

duced into two long obtuse subparallel processes; the shallow striae with large deep regular punctures; intervals 3 and 7 much higher than the others and each bearing a row of closely-set prominent tubercles (8–9 in ♂, 10–12 in ♀), those on interval 3 gradually increasing behind, the last one (at the top of the declivity) being very long, spine-like and directed backwards; on int. 5 a single tubercle behind the middle, and sometimes one or two rudimentary ones on each side of it; int. 9 with a row of small tubercles on the basal half. *Wings* not functional, the tips not folded and reaching the apex of the 4th visible ventrite. *Legs* with whitish scaling and suberect white setae, the posterior pairs of femora with a faint darker spot on the thickened part; the anterior tibiae not granulate internally, the mucros short and hidden by setae; the claws without a lateral seta.

Length, 14–19 mm.; width, 6–8½ mm.

Brazil: Rio de Janeiro; Santa Catharina.

Described from seventeen specimens.

This species stands in collections under the MS. names of *C. armatissimus* Chev. and *C. serietuberculatus* Jek. Its only very near ally is *C. ostracion* Pasc., a pale fawn-coloured insect with a broad median brown stripe extending from the apex of the thorax to two-thirds the length of the elytra; further the prothorax is much less strongly rugose, the elytral tubercles are much smaller, and joints 5 and 6 of the funicle are broader than long. In both species the wings are reduced and not functional.

Compsus confluens, sp. n.

♂♀. Integument black, densely clothed above and below with chalky white scaling; the head, rostrum and antennae brown, and a brown median stripe extending from the apex of the prothorax on to the elytra a little behind the scutellum, being broadest in front and gradually narrowing to a point on the elytra; the front tibiae and tarsi also brownish.

Head strongly constricted behind the eyes, which are very prominent, the forehead with a very deep longitudinal fovea. *Rostrum* about as long as its apical width and very strongly dilated from base to apex; a very broad deep curved furrow just in front of each eye, and a short longitudinal one a little above and in front of it, but these depressions more or less concealed by the very dense suberect scaling; the apical area declivous (and thus separated from the posterior part by a transverse angulated edge) and broadly

excavated; the epistome with an angulated margin. *Antennae* with the scape slightly exceeding the hind margin of the eye, stout, gradually dilated from base to apex, clothed with very dense narrow overlapping scales, and set with stout suberect setae; the funicle with joint 2 slightly longer than 1, 3 distinctly longer than 4, and 4–7 subequal and a little longer than broad. *Prothorax* as long as broad, widest at the base and slightly narrowing anteriorly, the sides almost straight; the dorsum very coarsely and remotely punctate and somewhat wrinkled, but without any flattening; the anterior margin sublobate behind the eyes. *Scutellum* elongate pear-shaped, broadest behind the middle, with a deep transverse impression before the middle, and densely covered with narrow overlapping scales. *Elytra* broadly ovate, the shoulders very prominent and almost rectangular, the sides not sinuate behind the shoulders but gradually narrowing posteriorly, the apices each produced into a long sharp process; the dorsal outline rising for a very short distance from the base, then flat to the top of the declivity, which has a slope of 60°; the striae shallow and some of them rather irregular, the punctures in stria 1 smaller and more numerous than those in 2, stria 4 strongly sinuate before the middle, two accessory striae between 3 and 4 behind the middle, and stria 5 irregular and subinterrupted not far from the base; interval 3 sharply carinate, without tubercles and produced at the top of the declivity into a long sharp horizontal process like that at the apex; ints. 5 and 7 also carinate, the former not reaching the base but curving outwards to join 7 at some distance behind the shoulder and ending in a small tubercle on the declivity; the white scales broad and strongly overlapping, the brown ones narrower; the setae small, irregular and recumbent, being much longer and slightly raised on the apical processes. *Legs* with rather stout raised white setae; the tibiae not denticulate internally, the apical mucros comparatively short and concealed; the second joint of the front tarsi a little broader than long, the claws with a lateral seta.

Length, 15–20 mm.; breadth, 5·5–8 mm.

Brazil: S. Paulo.

Described from six specimens.

Very similar in both form and colouring to *C. niveus* F., but in that species the head is much less constricted behind the eyes; the front margin of the prothorax is not lobate laterally; on the elytra the raised intervals all bear small tubercles and interval 5 is continued normally to the base, the striae are all quite regular and there are no accessory ones, and the setae are distinctly finer and longer.

Compsus pugionatus, sp. n. (Plate III, fig. 7.)

♂♀. Integument black, covered with scaling which is either uniformly pale blue-green (type) or uniformly pale coppery; the scales fairly dense on the head, rostrum, legs and lower surface; on the pronotum (in unabraded specimens) the elevated parts are squamose, the hollows of the foveae and sinuous impressions being bare; the elytra, on the contrary, have the raised parts bare, the scaling being dense in the foveae, leaving a bare pin-hole in the centre.

Head coriaceous beneath the scaling, with a small frontal fovea, and the front margin of the eyes shallowly impressed. *Rostrum* longer than the basal width, gradually dilated from base to apex, and with a few sparse punctures; the interantennal area moderately excavated and divided by a faint median ridge; the dorsum convex, with a narrow smooth median line and a very faint small oblique impression on each side (often obsolete). *Antennae* with the scape exceeding the eye, slender, gradually clavate, with recumbent pale setae and sparse pubescence; the funicular joints in order of length: 2, 1, 3, 4, (5, 6, 7), the terminal ones longer than broad, ovate. *Prothorax* as long as broad, widest at the base and gradually narrowing in front, the sides feebly rounded and with a shallow apical constriction; the gular margin shallowly sinuate; the dorsum with a shallow median impression containing twisted impressed lines and punctures, the lateral areas not impressed and with similar coarse sculpturings. *Scutellum* squamose, narrowly ovate in ♂, broader in ♀. *Elytra* subtriangular, the shoulders very prominent and forming an acute angle, the apices separately produced into a long sharp process; the dorsal outline almost flat from the base to the top of the declivity, which has a slope of 45°; the dorsum reticulate, with regular rows of large rounded punctures, the intervals narrow and undulating, interval 3 rather more prominent than the others owing to the slight flattening of the sutural area; no posterior callus; the scales small, round and slightly overlapping; the setae sparse, minute, recumbent and discernible with difficulty, those on the apical processes longer and raised. *Legs* with slightly raised pale setae; the tibiae not denticulate internally, the hind pair with a short mucro in the ♂ only; the second joint of the front tarsi longer than broad, the claws with a short lateral seta.

Length, 12·25–18·5; breadth, 4·5–6·5 mm.

Described from fifteen specimens.

Readily distinguished by its sharply pointed shoulders. I have retained for it Klug's manuscript name, under which it usually stands in collections.

Compsus adonis, sp.n. (Plate IV, fig. 11.)

♀. Integument black, completely hidden by dense scaling; the upper surface of the prothorax and elytra pale sage green, with most of the more raised portions chalky white, and spangled all over with minute metallic green scales; the head, front margin of the prothorax and apex of the elytra covered with iridescent coppery, golden and green scales; the lower surface pale blue-green throughout, with scattered metallic green scales; the legs metallic green, with a golden tinge on the tibiae, and the apices of the femora brilliant cobalt-blue.

Head with the forehead slightly depressed transversely and with a small round fovea; the eyes more obliquely inserted than usual, so that when viewed from above the inner edge slopes inwards at an angle of 45°. *Rostrum* much longer than the basal width and markedly dilated at the apex; the dorsum convex, without any furrow, and with a deep oblique impression on each side, the interantennal space deeply excavated, with a broad shiny bare line down the middle. *Antennae* with the scape comparatively slender and gradually clavate, with obliquely raised pale setae; the funicular joints in order of length: 2, 1, 3, 4, (5, 6, 7), the apical joints oblong. *Prothorax* as long as broad, parallel-sided from the base for two-thirds the length, then gently narrowing, with a distinct apical constriction; the apical margin not sinuate beneath; the dorsum very coarsely and rugosely punctate and slightly flattened in the middle. *Scutellum* almost an equilateral triangle, broadest behind, squamose. *Elytra* oblong-ovate, the line from the external basal angle to the shoulder straight and oblique, the shoulder forming an obtuse angle; the apices each produced into a densely scaly and setose process about 0·6 mm. long; the longitudinal outline quite flat, the declivity with a slope of about 60°; the dorsum with regular rows of large deep foveolae, which are entirely covered with scaling except for a small hole in the centre; the sutural area markedly flattened, so that interval 3 appears somewhat prominent, but is not truly costate; the posterior callus on int. 5 distinct but obtuse; the scales small, circular and overlapping; the irregular setae small, sparse and recumbent. *Legs* slender, with raised pale setae; the tibiae not denticulate internally; second joint of hind tarsi slightly longer than broad, the claws with a small lateral seta.

Length, 14 mm.; breadth, 5 mm.

Colombia: Medellin.

Described from one female.

Compsus iris, sp. n.

♂. Integument black, densely clothed throughout with scaling; the upper surface and sides of the rostrum, head and prothorax (except a quadrate green patch in the middle of the base of the last), the apex of the elytra, and a broad stripe approximately between striae 3 and 7 from base to apex of the elytra, metallic golden spangled with coppery and purple scales; the sutural area of the elytra from the base to the top of the declivity dull pale green sprinkled with metallic green scales; the sides of the elytra, the whole lower surface, legs and antennae, similarly pale green but with the metallic scales much more numerous.

Head not very convex, the forehead nearly flat, with a very faint short median stria; the anterior margin of the eyes deeply impressed. *Rostrum* much longer than the basal width, parallel-sided in the posterior half and gently widening to the apex; the interantennal space deeply excavated, the dorsum convex, with an oblique furrow on each side. *Antennae* with the scape only just reaching the hind margin of the eye, rather broad, compressed and gradually clavate; the funicular joints in order of length: 2, 1, 3, 7, (4, 5), 6, the shortest one about as long as broad. *Prothorax* a little longer than broad, gently narrowing from base to apex, the sides slightly rounded, and with a distinct apical constriction; the gular margin gently sinuate; the dorsum with a shallow triangular median impression containing a few coarse punctures and a short median stria in the apical half, the lateral areas not impressed and coarsely punctate. *Scutellum* a little longer than broad, oblong and densely squamose. *Elytra* elongate, broadest at the shoulders, which are prominent and nearly rectangular, and gradually narrowing behind, the apices jointly rounded; the dorsal outline quite flat to the declivity, which has a straight slope of 60°; the large punctures in regular rows and partly filled with scaling, none of the intervals being costate, the sutural area being flattened as far as stria 3; the scales small, circular and overlapping; the setae very small, recumbent and inconspicuous. *Legs* slender, with recumbent pale setae; the tibiae not denticulate internally, the hind corbels fully squamose; the second joint of the hind tarsi longer than broad, the claws without a lateral seta.

Length, 11 mm.; breadth, 4 mm.

Colombia: Medellin.

Described from a single specimen.

This beautiful and well-marked species is allied to *C. gemmeus* Fst. (1892), but apart from the colouring, it

differs in having the elytra subtriangular, being broadest at the shoulders, and the dorsal flattening is much more marked; the elytra also are scarcely striate and the punctures larger and more distant, being somewhat like those of *C. adonis*, sp. n. (Pl. IV, fig. 11).

Compsus zebra, sp. n. (Plate III, fig. 13.)

♀. Integument black, densely clothed with chalky white scaling more or less intermingled with pale green scales, the prothorax and elytra with narrow stripes that are either bare or clothed with pale green scales; head and rostrum with a continuous median black stripe and occasionally a patch of fuscous scaling behind each eye; the prothorax with five black stripes, usually edged with a line of green scales; the elytra with intervals 2, 4, 6, 8 and 10 (abbreviated) black, or partly or completely covered with pale green scaling; the legs with mingled green and white scales, the white predominating on the basal half of the femora and the green elsewhere.

Head not constricted behind the eyes, the forehead gently convex transversely and with a shallow median fovea. *Rostrum* much longer than broad, markedly dilated at the apex, convex dorsally, with a faint median carina, and a deep oblique furrow on each side, which is so filled up with scaling that it might easily be overlooked; the interantennal area broadly and deeply excavated, the median part bare and shiny. *Antennae* with the scape reaching the hind margin of the eye, slender, rather abruptly clavate, and clothed with narrow green scales and raised setae; the funicular joints in order of length : 2, (1, 3), (4, 7), (5, 6), the apical joints pear-shaped. *Prothorax* longer than broad, parallel-sided for two-thirds from the base, then narrowed and with a distinct apical constriction; the gular margin feebly sinuate; the dorsum not impressed, but slightly flattened and with a shallow furrow along the median black stripe (sometimes interrupted in the middle), and unevenly set with large shallow punctures, which are only distinct on the bare stripes. *Scutellum* quadrate, with dense green scaling. *Elytra* with the shoulders slightly sloping and prominent, the sides parallel from there to beyond the middle, somewhat produced and rather abruptly acuminate behind, the apices slightly dehiscent; the dorsal outline slightly rising at the base, then quite flat to the top of the declivity, which has a slope of 70°; the striae regular and in pairs, containing rather large round punctures, partly hidden by scaling; the intervals not costate, but 3 and 5 slightly more convex behind, the white intervals much broader than the black (or green), the latter finely coriaceous; the scales small and closely packed, the setae short

and quite recumbent. *Legs* slender, with raised setae; the tibiae not denticulate; the second tarsal joint a little longer than broad.

Length, 13·5–14·5; breadth, 5–5·5 mm.

Ecuador: Lita (type). Colombia: Buenaventura (*Rosenberg*).

Described from three specimens. Readily distinguishable by its characteristic coloration.

Compsus fractilineatus, sp. n. (Plate III, fig. 6.)

♂♀. Integument black, clothed with dark grey or blackish scaling (often abraded), the elytra with a broad stripe of silvery green scaling lying in the hollow between intervals 3 and 7 in the basal half and between ints. 3 and 6 in the apical, the two portions being broadly interrupted; the prothorax with a few metallic green scales in the middle of the base, and an irregular narrow lateral stripe of similar scales, which is continued on the elytra between striae 8 and 9 in the ♂, but not in the ♀; the sides of the sternum and the two basal ventrites more or less densely clothed with metallic green, which sometimes extends to the lower surface of the head.

Head fairly closely and shallowly punctate, not constricted behind the eyes, the forehead slightly flattened transversely and with a small median fovea. *Rostrum* a little longer than its basal width, gradually widened from base to apex, the sides straight; the dorsum with a broad deep triangular median depression and a small oblique impression on each side; the interantennal area broadly impressed, the epistomal bristles longer and more dense than usual. *Antennae* with the scape gradually widening from base to apex, exceeding the hind margin of the eye, and clothed with dark grey scales and subrecumbent pale setae; the funicle with bluish green hair-like scales, the joints in order of length: (1, 2), 3, 4, (5, 6, 7), the apical joints nearly as broad as long. *Prothorax* as long as the basal width, the sides gently rounded, broadest a little before the middle, with a distinct apical constriction; the gular margin not or very feebly sinuate; the dorsum with a deep conical median depression, divided across the middle by a transverse ridge, the lateral areas transversely rugose and shallowly impressed, the intervening ridges broad, smooth and with fine shallow punctation; no apparent setae. *Scutellum* small, trapezoidal, broadest behind, squamose. *Elytra* elongate, the shoulders sloping and obtuse, the sides subparallel from there to beyond the middle, the apices each produced into a short obtuse process; the dorsal outline convex, the posterior declivity with a slope of 50°; the striae regular, and with quadrate closely set punctures; interval 3 markedly costate throughout, 6 slightly

costate in the apical half and 7 in the basal half only, the space between these two and int. 3 deeply impressed, but interrupted in the middle by a broad transverse ridge uniting ints. 3 and 6, the sutural area flattened; the scales subcircular, the green ones larger and overlapping; the setae minute and inconspicuous, except at the apex where they form a short tuft, and on the pale dorsal stripe where they are numerous, very broad, curved and scale-like. *Legs* with dense dark grey scales and rather stout subrecumbent pale setae; the hind tibiae alone denticulate internally; the second tarsal joint slightly longer than broad.

Length, 10–12 mm.; breadth, 3½–4 mm.

Venezuela: Escorial, 10,000 ft.
Described from four specimens.

Genus Plococompsus, nov.

This genus is proposed for a small homogeneous group of species of *Compsus* that are characterised especially by the presence of postocular vibrissae on the prothorax. Other characters are as follows:—Scrobes narrow, curved downwards, but the upper edge attaining about the middle of the eye, so that the scape at rest passes across the lower half of the eye; the bare part of the scrobe not sharply defined, but gradually clothed with scales behind; epistomal setae very long and dense; scape not or only slightly exceeding the eye, comparatively slender, clavate, squamose, with the scales not overlapping; mentum with a group of setae on each side; insects with functional wings.

Genotype, *Compsus viridipes* Boh.

Other described species referable to the genus are:—*Compsus cuchloris* Pasc. (1880), *C. mirandus* Pasc. (1880), and *C. croesus* Faust (1892), and several apparently undescribed species are also known to me.

Owing to the presence of prothoracic vibrissae and the downwardly curved scrobes some authors would place this genus among the *Tanymecides*, but its obviously close relationship to *Compsus* renders such a course very unsatisfactory. The difficulty really arises from the inadequate definition of Lacordaire's distinction between the Brachyderine and Otiorrhynchine types of scrobe. In the Tanymecids and other true Brachyderines not only the lower, but also the upper edge of the scrobe curves more or less sharply downwards in front of the eye, so that the antenna when in a position of complete rest within the scrobe passes

clear beneath the eye, without covering any portion of it. The adoption of this position of the antenna as the essential criterion of the Brachyderine scrobe not only simplifies the interpretation of the character, but also appears to lead to a more satisfactory grouping of the genera. On this basis *Compsus*, *Plococompsus* and their allies will be transferred to a more natural position in the Otiorrhynchine series of Lacordaire, in the vicinity of *Eustylus* Schh., as Mr. G. C. Champion has already suggested (Biol. Cent.-Amer. Col. iv, pt. 3, p. 282).

Among the Otiorrhynchines the presence or absence of prothoracic vibrissae is clearly of far less taxonomic importance than in the Brachyderines; and as both *Diaprepes* and *Exophthalmodes* will now fall within the former group, there is no reason for widely separating these two very closely allied genera merely because *Diaprepes* possesses these vibrissae, as has been done by both Mr. Champion and Mr. W. Dwight Pierce.

Genus Exorides Pasc.

Exorides Pascoe, Ann. Mag. N.H. (5) vii, 1881, p. 43.

When describing this genus Pascoe was in doubt concerning its affinities, but there can be no question as to its close relationship with *Compsus*; indeed, the genotype, *E. carinatus* Pasc., had already been described by von Harold (1863) under the name of *Compsus wagneri*, and there are several other described species attributed to the latter genus which would be better placed in *Exorides*. Owing, however, to the diversity of the species at present included in *Compsus*, it is not easy to give a really satisfactory definition of Pascoe's genus, but it is here provisionally regarded as including those forms that present the following combination of characters:—Wings nonfunctional; the elytra narrow at the shoulders, with the bases more or less truncate obliquely and not separately rounded so as to project over the base of the prothorax; the scrobes continued right up to the lower anterior margin of the eye; and the scape of the antennae comparatively slender, abruptly clavate, and clothed only with pubescence or narrow hair-like scales, never with broad overlapping scales.

In the key given below I have included all the species known to me which come within this definition, but judging

by the descriptions and figures, the two following species should also almost certainly be referred to *Exorides* :— *Compsus labyrinthicus* Kirsch (Abh. Mus. Dresd. 1889, pt. 4, p. 22), from Colombia, and *C. whymperi* Olliff (Whymper's " Travels amongst the Great Andes," Suppl. Append., 1891, p. 63, fig.), from Ecuador.

As at present known, the genus is confined to the mountainous regions of Ecuador, Colombia and Venezuela, and it is not improbable that it will prove to be as prolific in species as is *Otiorrhynchus* in Europe.

In the two species of which the aedoeagus of the male has been examined, *E. wagneri* Har. and *E. praeteritus*, sp. n., the median lobe is very highly chitinised, strongly curved, and very much flattened dorso-ventrally, the unevorted sac being completely concealed within it; the struts are much compressed laterally and bisinuate as seen from the side. The tegmen forms a complete ring, the dorsal lobes being broad and united in their basal half, and slender and divergent distally; the strut is longer than the lobes and gradually dilated at the apex. The 8th ventrite is formed of two elongate transverse plates, the spiculum being very stout, and strongly curved and broadly laminate at its apex.

In the case of *E. wagneri* the general form of the genital tube of the ♀ is very similar to that of *Exophthalmodes* (fig. 3), but it is not so much compressed, and the enveloping membrane is even more strongly chitinised and lacks the transparent transverse bar; probably in consequence of this, the vagina seems to be less chitinous and there are apparently no rods; on the ventral surface there is an infolded slit in the envelope, the edges of which are more chitinised in the basal half, and at the apex the edges are armed with about six stout bristles on each side of the slit; the palps are well developed, but the tips are obliquely truncate, so that the tactile hairs on them, which are of varying lengths, project laterally outwards. The accessory gland of the spermatheca is unusually long, being in one case 1·5 mm. in length, the spermatheca itself (fig. 2, *d*) measuring only 0·55 mm. in both directions.

KEY TO THE SPECIES OF *EXORIDES* PASC.

1. (6) Elytra with a prominent tubercle on interval 3 at the top of the posterior declivity; scaling brown.
2. (3) Rostrum with a very shallow median impression, gradually

widening to the apex, and with the sides straight; prothorax a little broader than long, with the sides rounded; elytra with interval 3 forming a regular broad smooth costa, interval 4 not raised *wagneri* Har. (1863).

3. (2) Rostrum parallel-sided in the basal half, broadly dilated at the apex, and with a broad deep median furrow; prothorax as long as broad, the sides straight from the base to beyond the middle; elytra with interval 3 narrowly undulating behind and not well defined, interval 4 shortly and irregularly raised behind middle.

4. (5) Costae on the prothorax straight and smooth; basal margins of elytra straight, the posterior tubercles comparatively small and distant, projecting backwards not nearly as far as the apices; posterior filamentous growth on elytra rust-red . . . . . *praeteritus*, sp. n.

5. (4) Costae on prothorax curved and much interrupted; basal margins of elytra sinuate between interval 3 and the external angle, the posterior tubercles very large and subcontiguous, projecting backwards as far as the apices (when viewed in profile); the posterior growth blackish brown . . . . . *equicaudatus*, sp. n.

6. (1) Elytra without such tubercles.

7. (20) Apical joints of funicle not longer than broad, bead-like; elytra with the apices not, or only very shortly, produced.

8. (19) Elytra not tuberculate at the apex.

9. (12) Sutural area of elytra markedly depressed as far as the top of the declivity; median furrow on rostrum shallow.

10. (11) Rostrum parallel-sided; scutellum small and narrow, longer than broad . . . . *rugosus* Tasch. (1870).

11. (10) Rostrum slightly narrowed from base to apex; scutellum moderately large, twice as broad as long *obesus*, sp. n.

12. (9) Sutural area of elytra not depressed; median furrow on rostrum broad and deep.

13. (16) Elytra with intervals 3 and 5 strongly and evenly costate; colour black, with brown or blackish scaling.

14. (15) Costae on intervals 3 and 5 of the elytra terminating abruptly before the posterior declivity, intervals 1 and 7 not costate; prothorax narrowly and shallowly impressed, as long as (♀) or longer than broad (♂); legs piceous . . . . . *abruptecostatus*, sp. n.

15. (14) Costae on intervals 3 and 5 of the elytra complete, intervals 1 and 7 similarly costate; prothorax broadly and deeply impressed, broader than long (♀); legs black.

septemcostatus, sp. n.

16. (13) Elytra without regular even costae.
17. (18) Prothorax parallel-sided from base to beyond middle, then narrowed to apex; elytra with no prominence at the apex of interval 5, and the line between the external basal and humeral angles straight; rostrum parallel-sided; upper surface with black or brownish grey scaling; legs red-brown, knees and tarsi darker; length 8–10 mm. . . . . *lindigi* Kirsch (1889).
18. (17) Prothorax strongly rounded at the sides, broadest at the middle; elytra with a small prominence at the apex of interval 5, and the line between the external basal and humeral angles strongly sinuate; rostrum widened in front; upper surface with more or less green scaling; legs black; length 16–17 mm.
marshalli Bovie (1908). (Plate IV, fig. 9.)
19. (8) Each elytron with an obtuse rounded tubercle at the apex.
espeletiae Kirsch (1889).
20. (7) Apical joints of funicle clavate or subconical; apices of elytra strongly produced (except in *pyriformis*).
21. (22) Apices of elytra jointly rounded, elytra broadest far behind the middle (♀) . . . . . *pyriformis*, sp. n.
22. (21) Apices of elytra each produced into a long process, elytra broadest at or before the middle.
23. (26) Funicle with the two basal joints equal.
24. (25) Rostrum parallel-sided, with no median furrow, but with a low median costa; prothorax distinctly impressed on the disk and there quite devoid of tubercles; elytra broadly ovate, the apical processes long and very sharp, and the humeral angles acute; scaling dense and dull green all over . . . . . *inflatus*, sp. n.
25. (24) Rostrum gradually widened from base to apex, with a broad deep median furrow; prothorax scarcely impressed on the disk and there rugosely tuberculate; elytra narrowly subcylindrical, the apical processes comparatively short and obtuse, and the humeral angles rounded; scaling brownish grey above and green at the sides . . . . . *cylindricus*, sp. n.
26. (23) Joint 2 of funicle longer than 1.
27. (38) Interval 5 not carinate.
28. (37) Mandibular scar sessile or slightly raised.
29. (30) Elytra constricted close to the base, without any humeral angle and with the external basal angle markedly produced outwards and forwards . . . *masoni*, sp. n.
30. (29) Elytra not so constricted, the external basal angle not

produced and inconspicuous, the humeral angle distinct and rounded.

31. (36) Elytra not transversely wrinkled throughout, interval 3 costate.

32. (33) Forehead with a transverse depression; elytra constricted at extreme base, the line between the external and humeral angles being sinuate, striae 3–6 regular, the posterior declivity steep (80°) . *lajoyei* Bovie (1907).

33. (32) Forehead not transversely depressed; elytra constricted at the base, striae 3–6 irregular, the posterior declivity much flatter (35°).

34. (35) Elytra regularly punctate-striate, except in striae 3–6 in which the punctures are quite irregular; the extreme lateral margin and the spaces between intervals 3 and 7 covered with metallic green scales, the latter space interrupted near the middle by a transverse bare costa. *quadrivittatus* Kirsch (1889).

35. (34) Elytra rugosely and irregularly reticulate, clothed throughout with submetallic green scaling, but with interval 3 strongly elevated and bare, and interval 7 slightly so in the middle only . . . . . *caudatus*, sp. n.

36. (31) Elytra with strongly raised irregular transverse ridges throughout, interval 3 not costate . *corrugatus*, sp. n.

37. (28) Mandibular scar placed at the end of a very long peduncle. *pedunculatus*, sp. n.

38. (27) Intervals 3, 5 and 7 of the elytra distinctly and evenly carinate throughout . . . . . *equatorius*, sp. n.

Exorides praeteritus, sp. n.

Exorides carinatus Olliff (*nec* Pasc.), Whymper's "Travels amongst the Great Andes," Suppl. App., 1891, p. 65, fig.

♂. Integument black, the pronotum and elytra with grey scaling in the more depressed areas, the ridges being bare; the elytra with a moss-like growth of rust-red filaments around the tubercles at the top of the declivity, and an elongate patch of the same nature beneath the shoulder; the legs with dense scaling, and the sides of the sternum and venter thinly squamose.

Head shiny, with faint minute punctures and a few larger ones, each containing a short recumbent seta; the forehead broadly impressed in the middle and with a deep median fovea. *Rostrum* about as long as broad, parallel-sided in the basal half, dilated at

the apex, with a broad deep median furrow, which is continued on to the forehead, and a short longitudinal impression on each side; the interantennal area broadly excavated. *Antennae* with the scape just reaching the hind margin of the eye, rather densely clothed with narrow grey scales and with subrecumbent setae; the funicular joints in order of length: 2, 1, 3, 4, (5, 6, 7), the apical joints nearly as broad as long. *Prothorax* as long as broad, broadest at the base, very gradually narrowed in front and with a shallow apical constriction; the basal and apical margins gently rounded, the gular margin rather deeply sinuate; the dorsum with a broad deep uneven conical median depression, enclosed on each side by a sparsely punctate broad straight smooth costa, the external areas less rugose and shallowly impressed in front and behind. *Scutellum* oval, longer than broad, finely coriaceous, bare. *Elytra* oblong ovate, the basal margins individually truncate and together forming a gentle curve; the shoulders sloping, the sides parallel thence to beyond the middle, the apices jointly rounded; the dorsal outline almost flat from the base to the top of the declivity, which has a slope of 60°; the sutural area flattened, and the punctures very shallow, large, subconfluent and indistinct; interval 3 rather strongly costate and curving inwards near the base, then becoming less pronounced and much more irregular, and terminating at the top of the declivity in a low rounded backwardly-projecting tubercle; int. 4 raised for a short distance behind the middle and connected with int. 3 by the raised transverse septa; int. 7 costate from the base to the declivity; the scales small and overlapping; the setae short and curved, numerous between ints. 3 and 7, and a small short tuft of them just above the apex. *Legs* with subrecumbent setae; the tibiae not denticulate internally, the hind pair shortly mucronate; joint 2 of the front tarsi longer than broad.

Length, 13·5 mm.; breadth, 5·25 mm.

Ecuador: lower slopes of Antisana, 13,000 ft. (*E. Whymper*).

One of Whymper's specimens was placed in Pascoe's collection with *E. wagneri*, but, apart from the distinctions given in the key, it differs markedly in the male genitalia, the median lobe being less curved, much broader and much less sharply pointed in *praeteritus*.

Exorides equicaudatus, sp. n. (Text fig. 4.)

♂. Integument black, with a few grey scales in the foveae; the venter bare, with sparse pale short recumbent setae.

Head impunctate, the forehead and vertex somewhat flattened;

the ocular margins rather deeply impressed above and in front. *Rostrum* longer than the basal width, parallel-sided in the basal half and strongly dilated at the apex; the dorsum with a very broad median furrow in the basal half, the ridges on each side of it bearing a faint longitudinal impression, and the interantennal space with a transverse arcuate impression within the usual depressed area. *Antennae* with the scape exceeding the eye, gradually clavate, bearing fine recumbent hair-scales and sparse suberect pale setae; the joints of the funicle in order of length: 2, 1, 3, 4, (5, 6), 7, the apical joints pyriform. *Prothorax* as long as broad, parallel-sided from the base to beyond the middle and thence gradually narrowed to the apex; the dorsum occupied by three broad longitudinal impressions, all rugosely scrobiculate, the median one being broader than the others, but narrowed in front, which the lateral ones are not; the carinae dividing these impressions uneven and undulating;

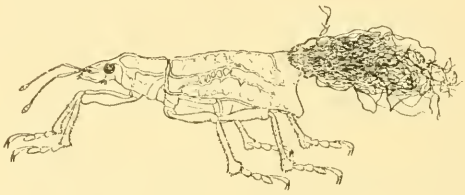

Fig. 4.—*Exorides equicaudatus*, sp. n.

the anterior margin very shallowly trisinuate dorsally, with a small lateral lobe below the eye, and the gular margin rather deeply sinuate. *Elytra* oblong-ovate, the sides nearly parallel, but shallowly sinuate just behind the shoulders, the apices jointly rounded, and the dorsal outline quite flat from the base to the declivity; the basal margin markedly sinuate between the callus at the base of interval 3 and the external angle; the whole surface coarsely and rather irregularly reticulate, interval 3 slightly raised but indefinite, interval 4 irregularly raised for a short distance behind the middle, and interval 7 forming a prominent sharp carina; at the summit of the declivity two large contiguous tubercles, from which in the type projects horizontally backwards an extraordinary growth forming a dense tuft of blackish brown filaments like a bushy horse's tail. *Legs*: tibiae not denticulate internally, the hind pair not mucronate; second joint of front tarsi about as long as broad.

Length, 16 mm.; breadth, 6·5 mm.

Ecuador: Quito.

Described from a single male.

The very remarkable outgrowth from the tubercles on the elytra looks as though it might possibly be due to a fungus; but Mr. J. Ramsbottom, of the British Museum, has kindly examined it and reports that the substance of which it is composed is certainly not of fungous origin; and the same is true of the reddish moss-like filaments that are to be found in the same position in *E. wagneri* Har. and *E. praeteritus*, sp. n.

Exorides obesus, sp. n. (Plate IV, fig. 12.)

♀. Integument black, the upper surface of the thorax and the elytra covered with greenish grey scaling, the elevated ridges being bare; the head, rostrum, legs, sternum and venter also bare, except for a few scales near the eyes and at the sides of the mesosternum.

Head with a few very shallow punctures, a large rounded frontal fovea and two smaller ones on the vertex; the eye-margins impressed in front. *Rostrum* a little shorter than its basal width, gradually narrowed from base to apex, the sides quite straight; the interantennal area evenly excavated; the dorsum with a very shallow median impression on the anterior half, a shallow longitudinal furrow on each side, and a few sparse punctures. *Antennae* missing. *Prothorax* broader than long, parallel-sided for a short distance from the base, then strongly narrowed, the sides rounded and with a distinct apical constriction; the gular margin feebly sinuate; the dorsum with a very deep broad uneven median impression, the adjoining costae and the lateral areas very rugose, the latter shallowly impressed near the base. *Scutellum* strongly transverse, oblong, very convex longitudinally, and bare. *Elytra* very broadly ovate, strongly rounded at the sides and broadest at the middle; the basal margin jointly sinuate, the shoulders very oblique, followed by a small sinuation, the apices jointly rounded; the dorsal outline gently convex, the posterior declivity very steep (80°); the foveae very irregular, shallow, mostly ill-defined, and often transversely confluent, the 9th row (beneath the shoulder) deeply impressed for one-fourth from the base; interval 3 forming a sharp sinuous carina, the flattened sutural area having several fine transverse ridges; the outer dorsal areas shallowly impressed and broken by two very ill-defined ridges, the front one a little before the middle and transverse, the other a little behind the middle and oblique; the suture distinctly elevated at the top of the declivity and the posterior callus forming a small tubercle; the setae minute and only discernible with difficulty. *Legs* with scattered shallow punctures and sparse oblique pale setae; the tibiae sparsely denti-

culate internally, the hind pair not mucronate; the second joint of the front tarsi about as long as broad.

Length, 16 mm.; breadth, 8 mm.

Colombia.

Described from one female.

Allied to *E. rugosus* Tasch., which is however a much narrower insect, with the sides of the elytra not sinuate behind the shoulders and bearing recumbent white setae.

Exorides abruptecostatus, sp. n. (Plate IV, fig. 7.)

♂♀. Integument black, the elytra with obscure blackish sealing.

Head with very sparse fine punctures and a large round frontal fovea; the upper margin of the eyes impressed, the anterior one more deeply so. *Rostrum* about as long as its basal width, gradually dilated from base to apex, the sides straight; the dorsum sparsely punctate, with a broad median furrow, which narrowly unites with the frontal fovea, and a shallow stria on each side of it; the interantennal space with a broad shallow curved impression in the usual depressed area. *Antennae* with the scape not exceeding the eye, clothed only with sparse pale recumbent setae; the joints of the funicle in order of length: 2, 1, 3, (4, 5, 6, 7), the apical joints about as long as broad, bead-like. *Prothorax* as long as (♀) or a little longer than broad (♂), parallel-sided from the base to three-fourths its length in ♂, the sides slightly convergent from the base in ♀; the dorsal depression very shallow and comparatively narrow, this and the lateral ones very coarsely foveolate, the spaces separating them not carinate, but either smooth or transversely wrinkled and with sparse small punctures; the apical margin truncate above, the gular portion very shallowly sinuate. *Elytra* oblong-ovate in ♂, broader and the sides slightly rounded in ♀, the apices jointly rounded; the dorsal outline slightly curved from the base to the top of the declivity, which has a slope of about 70°; the shoulders very obliquely rounded and the sides not sinuate behind them; the shallow striae with regular rows of quadrate punctures, except between striae 5 and 8 behind the middle where the punctures are somewhat confused; intervals 3 and 5 raised into smooth costae which terminate rather abruptly at the top of the declivity, intervals 7 and 9 carinate for a short distance at the base only; the intervals with irregular dark recumbent setae, which become longer and suberect towards the apex. *Legs* piceous, devoid of sealing, with rather large scattered setigerous punctures, the interspaces smooth or coriaceous on the femora and closely and finely punctate on the

tibiae; the tibiae subdenticulate internally, the hind pair not mucronate; the second joint of the front tarsi broader than long.

Length, 12–14·75 mm.; breadth, 4·75–6 mm.

Ecuador: Macas (*Buckley*).

Described from one pair.

Allied to *E.* (*Compsus*) *lindigi* Kirsch, but in that species the rostrum is parallel-sided, the thoracic impression is broader and deeper, the elytra are not costate, and the second joint of the front tarsi is not broader than long.

Exorides pyriformis, sp. n. (Plate III, fig. 2.)

♀. Integument black; the sides of the rostrum, head, prothorax, elytra (outwards from interval 5), sternum and venter, clothed with pale metallic green scaling; the dorsum of the head prothorax and elytra with grey scales; the femora (except the apex) and the lower surface of the posterior pairs of tibiae green, the rest grey.

Head finely and very closely punctate, with scattered larger punctures, each containing a short recumbent flattened seta; the forehead with a faint transverse depression and a round median fovea; the eye margins scarcely impressed. *Rostrum* a little longer than the basal width and somewhat dilated at the apex; the interantennal area broadly and deeply impressed; the dorsum with a broad triangular impression in the anterior half containing a faint median costa, and a short oblique sublateral impression on each side in the basal half; the sculpture like that of the head. *Antennae* with the scape reaching well beyond the eye, with grey scaling and erect pale setae; the joints of the funicle in order of length: 2, 1, 3, (4, 5, 6, 7), the apical joints much longer than broad, clavate. *Prothorax* subcylindrical, longer than broad, widest at the base and very gradually narrowing anteriorly, the sides almost straight; the gular margin with no trace of sinuation; the dorsum with the usual three longitudinal impressions, the outer ones being shallower and more rugose than the median, the intervening costae broad and fairly even, with dense minute punctures and a few larger ones. *Scutellum* cordate, densely squamose. *Elytra* pyriform, broadest far behind the middle, subacuminate behind, with the apices jointly rounded, the basal margins slightly curved, and the line from the external basal to the humeral angle straight and sloping; the dorsal outline markedly convex, the posterior declivity very steep (80°); the rows of reticulate foveolae fairly regular throughout and transversely subconfluent in pairs; interval 3 forming a strong sinuous carina from the base to the top of the declivity, int. 7 much less elevated and twice deeply interrupted near the base; numerous

irregular short recumbent setae. *Legs* with pale subrecumbent setae; the tibiae not denticulate internally; the second joint of the front tarsi longer than broad.

Length, 14 mm.; breadth, 6 mm.

Colombia.

Described from a single specimen.

Exorides septemcostatus, sp. n. (Plate IV, fig. 3.)

♀. Integument black, with dirty grey scales in the punctures.

Head with uneven fine punctation and scattered larger punctures; the fovea small and lying in a shallow depression; the upper and anterior margins of the eyes deeply impressed. *Rostrum* as long as its basal width, the sides subparallel to the middle and then slightly dilated to the apex; the dorsum with a shallow median furrow (which is very shallowly united with the frontal depression) and a deep oval impression on each side of it; the interantennal space simply depressed; on each side of the median furrow a longitudinal row of punctures, the rest of the surface more finely and unevenly punctate. *Antennae* with the scape rather broad and reaching the prothorax, gradually widened to the apex, not squamose but with subrecumbent pale setae; the joints of the funicle in order of length: (1, 2), 3, 4, (5, 6, 7), the apical joints as long as broad, bead-like. *Prothorax* broader than long, gently rounded at the sides, widest a little behind the middle, and more narrowed in front than behind; the apical margin truncate, the gular portion not sinuate; the dorsum with a broad median depression, bounded on each side by a well-marked and finely punctate costa; the lateral areas narrower than the median one and all of them rugosely foveolate. *Elytra* ovate, very slightly rounded at the sides, a trifle broader at the middle than at the shoulders, the apices jointly rounded, the shoulders obtusely prominent; the dorsal outline gently convex, the declivity with a slope of about 60°; the shallow striae with large quadrate punctures which are regular throughout; intervals 1, 3, 5 and 7 regularly and evenly costate and with dense fine punctures; the setae sparse, short and recumbent, not longer or raised behind. *Legs* finely and closely punctate, with grey scaling and short suberect setae; the tibiae not denticulate, and the hind pair not mucronate; the second joint of the front tarsi slightly transverse.

Length, 9 mm.; breadth, 4 mm.

Colombia.

Described from a single female.

In general form this species much resembles *E. lindigi*

Kirsch, but apart from the markedly costate elytra, the rostrum is dilated at the apex, its median sulcus much narrower, and the lateral sulci shorter.

Exorides lindigi Kirsch (1889).

There is in the British Museum a single specimen from Colombia that agrees well with Kirsch's description, but accompanying it are examples that present a markedly different appearance owing to the more elongate prothorax and the more coarsely sculptured elytra, each of which bears at the apex a very short sharp process (Plate IV, fig. 2). As, however, these appear to be linked up with the typical form by various intermediate specimens, they are here treated as merely an extreme variation.

Exorides cylindricus, sp. n. (Plate IV, fig. 8.)

♂. Integument black, the depressions on the prothorax and elytra filled with almost circular contiguous scales, which are dirty grey on the disk and green on the sides; no scales elsewhere, except a few isolated green ones on the sternum and abdomen.

Head with fairly numerous irregular punctures of varying size; the frontal fovea deep and elongate, and the ocular margins deeply impressed. *Rostrum* longer than its basal width, gradually widened from base to apex, with a few scattered large punctures; the median furrow broad and deep, uniting with the frontal fovea, and with a deep shorter impression on each side of it. *Antennae* with the scape extending slightly beyond the eye and bearing scattered punctures containing rather long subrecumbent setae and a few much finer hairs; the funicular joints in order of length: (1, 2), 3, (4, 5), (6, 7), the apical joints much longer than broad, pear-shaped. *Prothorax* much longer than broad, almost cylindrical, but slightly narrowed near the apex, the basal margin truncate and the external angles right angles; rugosely tuberculate throughout, not impressed on the disk, but only somewhat flattened, the tubercles each bearing a few punctures; the front margin truncate above and shallowly sinuate beneath. *Elytra* very narrow and elongate, the shoulders only slightly projecting and hardly separable from the external basal angle, the apices each produced into a blunt point, the processes being rather widely separated; the dorsal outline almost flat, the declivity with a slope of about 45°; the elytra coarsely and reticulately punctate, the rows of punctures being fairly regular, but with a tendency to become transversely confluent in the sub-

lateral area; the intervals narrow, sinuate and indefinite, but 3 rather more raised than the rest in the basal two-thirds; a very few, widely scattered punctures on the raised areas; some fairly long suberect setae about the apex, but none on the disk. *Legs* smooth, with scattered setigerous punctures; the tibiae denticulate internally, the hind pair with a distinct mucro; the second joint of the front tarsi longer than broad.

Length, 15 mm.; breadth, 4·5 mm.

Colombia: San Lorenzo Mt., 8500 ft., Magdalena, 28. vii. 1920 (*Frank R. Mason*).

Described from a single male, for which I am indebted to Mr. Mason, who tells me that it was found on an epiphytic plant in dense forest.

The very elongate form, tuberculate thorax and mucronate hind tibiae (perhaps only a male character) should make this species easily recognisable.

Exorides inflatus, sp. n. (Plate IV, fig. 6.)

♂♀. Integument, entirely covered (including even the venter) with contiguous, small, pale dull green scales, variegated here and there with bluish ones, especially on the more elevated parts of the thorax and elytra, on the tibiae and a dark transverse band on the club of the femora, on the lower surface of the elytral mucros, and forming a triangular patch in the middle of the base of the second visible ventrite.

Head with fine shallow punctation and a few scattered deeper punctures (all hidden by scaling), without any frontal fovea, and the ocular margins not impressed. *Rostrum* a trifle longer than its basal width, parallel-sided; the dorsum with a low median costa and a shallow impression on each side of it anteriorly, and another more lateral impression posteriorly; the interantennal hollow divided in the middle by a low costa. *Antennae* with the scape slender and exceeding the eye, thinly clothed with fine bluish hair-scales and suberect pale setae; funicular joints in order of length: (1, 2), 3, 4, (5, 6, 7), the apical ones longer than broad, pear-shaped. *Prothorax* as long as (♀) or slightly longer than broad (♂), parallel-sided from the base to beyond the middle, then narrowed (with straight sides) to the apex, without any apical constriction; the dorsum with a broad deep longitudinal impression, the floor of the impression and the lateral areas shallowly foveate, the intervening ridges not costate; the apical margin truncate above and very shallowly sinuate beneath. *Elytra* broadly ovate, widest at or before the middle, strongly acuminate behind, the apex of each

produced into a fairly long and very sharp process; the shoulders sharply and rectangularly prominent, the sides being markedly sinuate behind them; the dorsal outline rising from the base, then quite flat to the top of the declivity, which has a slope of 45°; the dorsum unevenly foveolate, the foveolae in fairly regular rows next the suture and on the inflexed margins, elsewhere quite irregular; interval 3 strongly elevated and sinuous, terminating in an obtuse tubercle at the top of the declivity, and emitting about the middle an oblique carina which reaches interval 7; the setae irregular, short and subrecumbent on the disk, longer and more raised towards the sides and apex; each scale with a central impression. *Legs* rather slender, with obliquely raised pale setae; the tibiae not denticulate internally, the hind pair not mucronate; the second joint of the front tarsi longer than broad.

Length, 11–13 mm.; breadth, 4–5·25 mm.

Venezuela (type). Colombia.

Described from ten specimens.

The relatively broad elytra, sharply angulate shoulders and very sharp apical processes give this species quite a distinctive appearance.

Exorides masoni, sp. n. (Plate IV, fig. 4.)

♀. Integument black, with rather thin, grey or earth-brown scaling on the dorsum, intermingled with green scales towards the dorsal margin; on the inflexed margins of the elytra and on the sides of the sternum and abdomen the green scales predominate; the median portion of the lower surface bare.

Head with very shallow sparse punctation and without any frontal fovea, the ocular margins not impressed and the eyes rather less convex than usual. *Rostrum* about as long as broad, parallel-sided; the dorsum with a broad triangular impression on the basal half, with a short longitudinal furrow on each side of it, and the interantennal area absolutely flat. *Antennae* with the scape exceeding the eye, with fine shallow punctures and recumbent pale setae; the funicular joints in order of length : 2, 1, 3, (4, 5), (6. 7), the apical joints longer than broad, pear-shaped. *Prothorax* as long as broad, parallel-sided from the base to the middle, then gradually narrowed to the apex, without any apical constriction; the basal margin strongly rounded, the external angles obtuse; the front margin truncate above and not sinuate beneath; the dorsum with a broad shallow uneven median impression bounded on each side by a low costa, which is continuous with interval 3 on the elytra; the external areas very shallowly impressed on the basal half. *Scutellum* circular.

Elytra subelliptical, constricted at the base, the basal margin deeply and jointly sinuate, the basal angles projecting outwards and forwards in the form of a blunt tubercle, the sides gently rounded behind this prominence and without any humeral angle, the apices jointly produced and each terminating in a short sharp process; the first four rows of punctures rather large and shallow, those of the first two rows more or less confluent transversely in pairs, those of the outer rows much smaller and rather indistinct on the posterior half; the suture rather sharply elevated on the declivity, which has a slope of 70°, interval 3 costate and bare, and a lateral costa running rather obliquely downwards from the basal angle almost to the level of the hind coxa; no setae on the disk and only a few recumbent ones about the apex. *Legs* with mingled grey and green scales and short raised pale setae; the tibiae minutely denticulate internally, the hind pair not mucronate; the second joint of the front tarsi a little longer than broad.

Length, 12 mm.; breadth, 4 mm.

Colombia: San Lorenzo Mt., 8500 ft., Magdalena, 28. vii. 1920 (*Frank R. Mason*).

Described from a single female kindly given to me by Mr. Mason, who found it on an epiphyte in dense forest.

Distinguished from all the known species of the genus by the projecting basal angles of the elytra and the flat interantennal space on the rostrum. Otherwise in general facies very similar to *E. quadrivittatus* Kirsch, but in that species the rostrum widens gradually to the apex and bears a narrow median furrow; the elytra have the apical processes much longer and blunt, and about the middle there is a low transverse costa between intervals 3 and 7.

Exorides pedunculatus, sp. n. (Plate IV, fig. 5.)

♀. Integument black, with the following areas covered with blue-green scaling: the sides of the rostrum, head, prothorax, sternum and venter, the femora, and the elytra between striae 3 and 9; a fair number of similar scales on the ridges of the pronotum and on the inner face of the tibiae, and a few on the sutural area of the elytra; the inner edge of the green stripe on each elytron is triangularly indented a little before the middle owing to the presence there of a rudimentary transverse ridge.

Head coriaceous, transversely flattened between the eyes and with a round median fovea; the eye-margins not impressed. *Rostrum*, without the mandibles, as long as its basal width and slightly widened at the apex; the interantennal area shallowly

impressed and divided down the middle by a low ridge; the dorsum with a median furrow that is deepest in front, becoming shallower behind and not reaching the base, the lateral impressions shallow or nearly obsolete; the mandibular scar situated at the end of a long stout triquetrous peduncle which projects 0·7 mm. beyond the apex of the rostrum. *Antennae* with the scape exceeding the eye and with subrecumbent setae; funicular joints in order of length: 2, 1, 3, 4, (5, 6, 7), the apical joints longer than broad, pear-shaped. *Prothorax* as long as broad, parallel-sided from base to middle, then narrowed to the apex and with a shallow apical constriction; the apical margin truncate above and feebly sinuate beneath; the dorsum with a deep smooth impression forming a furrow in front and widening out behind, there being a large raised triangular area in the middle of the base; the lateral areas very shallowly impressed and almost smooth. *Scutellum* slightly longer than broad, ovate, bare. *Elytra* ovate, the basal margin jointly sinuate, the shoulders almost rectangular, the sides gently rounded, and the apices each produced into a long conical process; the longitudinal outline distinctly convex, forming a continuous curve with the posterior declivity, which has a comparatively gentle slope of about 35° or 40°; the rows of punctures regular but shallow; the sutural area flattened so that interval 3 forms a low costa and with a marked depression at the base, the area between ints. 3 and 7 shallowly depressed from the base almost to the middle and bounded behind by a rudimentary transverse costa. *Legs* slender; the tibiae not denticulate internally, the hind pair not mucronate; the second joint of the front tarsi a little longer than broad.

Length, 15 mm.; breadth, 5·5 mm.

Ecuador.

Described from three specimens, for which I am indebted to M. Albert Bovie, of Brussels.

Another member of the *quadrivittatus* group, but readily distinguished by its mandibular processes.

Exorides caudatus, sp. n. (Plate IV, fig. 1.)

♂♀. Integument black, not very densely clothed above with pale metallic green scales, often intermingled with whitish scales on the middle of the disk, the scales on the more elevated areas and on the apical processes blue; interval 3 of the elytra more or less bare (? abraded); the lower surface with similar mingled green and blue scales.

Head very shiny when the scaling is removed, with very fine

shallow punctation and a deep round frontal fovea; the eye margins not impressed. *Rostrum* rather longer than its basal width and gradually widening towards the apex, sculptured like the head, with a very shallow median longitudinal impression and a short oblique one on each side of it; the interantennal area shallowly impressed. *Antennae* with the scape exceeding the eye, very finely punctate, with sparse recumbent pubescence and a few erect pale setae; the funicular joints in order of length: 2, 1, 3, 4, (5, 6, 7), the apical joints longer than broad and pear-shaped. *Prothorax* as long as broad, parallel-sided from the base to the middle, thence gradually narrowed and with a distinct apical constriction; the apical margin truncate above and not sinuate beneath; the dorsum with three broad longitudinal impressions, the lateral ones shallower and more uneven than the median one. *Scutellum* circular, with dense narrow scales. *Elytra* elongate oval, in the ♂ sloping from the basal angle to the shoulder and thence gradually narrowed to the apex; in the ♀, the shoulders nearly rectangular and the sides subparallel to the middle; the base shallowly and jointly sinuate, the apices separately produced into a long stout pointed process, these being rather more divergent in the ♀ than in the ♂; the dorsal outline almost flat, the declivity with a slope of only 35°; the dorsum with large shallow foveolae which are for the most part ill-defined and irregularly confluent; interval 3 costate throughout, and 7 for a short distance in the middle only; the setae short stout and recumbent, being most numerous between intervals 3 and 7, and becoming finer, longer and more erect at the apex, especially on the processes. *Legs* slender, densely clothed with blue-black scaling and with scattered green scales, which form denser patches at the base of the femora and on the thickened portion; the tibiae not denticulate and the hind pair not mucronate; the second joint of the front tarsi much longer than broad.

Length, 13·25–17 mm.; breadth, 3·6–5·5 mm.

Colombia: Bogota.

Described from five specimens.

Very closely allied to *E. quadrivittatus* Kirsch, but in addition to the characters given in the key that species differs in having the shoulders of the elytra more rounded and less prominent, and the setae on the disk are much shorter and finer.

Exorides corrugatus, sp. n. (Plate III, fig. 8.)

♂♀. Integument black, the prothorax with a more or less interrupted stripe of pale green scaling on each side, the elytra with green

scaling in the foveae only, and irregular patches of similar scales along the sides of the sternum and two basal ventrites.

Head not constricted behind the eyes, finely and closely punctate, with a transverse depression on the forehead containing a large median fovea. *Rostrum* about as long as its apical width, gradually widening from base to apex, the sides straight; the dorsum finely and closely punctate, with scattered larger punctures, a deep median triangular depression and a small longitudinal impression on each side of it; the interantennal area deeply impressed. *Antennae* with the scape exceeding the eye, moderately slender, very finely and closely punctate and with sparse recumbent setae; funicular formula: 2, 1, 3, (4, 5, 6, 7), the apical joints being pear-shaped. *Prothorax* as long as broad, subcylindrical, the sides very slightly rounded, with a very shallow constriction near the base and a deep one near the apex; the apical margin truncate dorsally and shallowly sinuate beneath; the dorsum with a very broad, almost smooth, deep median depression, the adjoining costae fairly even and irregularly punctate, the outer areas transversely rugose and with a deep impression anteriorly. *Scutellum* small, somewhat transverse, bare. *Elytra* subelliptical, the humeral angle very small and obtuse, the lateral margins (as seen from above) much sinuated, the apices each produced into a short blunt process, usually rather closely approximated; the dorsal outline very gently curved, and the declivity with a slope of only 40°; the punctures forming regular rows only on the inflexed margins, those on the disk large, deep and transversely confluent, the interspaces forming irregular transverse corrugations; there are thus no regular intervals or costae, but the sutural area is slightly flattened as far as the nominal 3rd interval; the scales short oval or subcircular, and slightly overlapping; the irregular short curved setae mostly confined to the depressions, like the scaling. *Legs* with fuscous scaling and slightly raised pale setae; the tibiae not denticulate and the hind pair not mucronate; the second joint of the front tarsi as long as broad.

Length, 12–13 mm.; breadth, 4–4½ mm.

Venezuela: Escorial, 10,000 ft.

Described from thirteen specimens.

The much reduced shoulders and the strong transverse corrugations on the elytra give this species a distinctive appearance.

Exorides equatorius, sp. n. (Plate IV, fig. 10.)

♀. Integument black, thinly clothed with pale dull greyish green scaling, which is densest between intervals 3 and 7 on the elytra

and continued as a broad lateral stripe on the thorax and head; the sides of the sternum and venter with green scales, the remainder bare and rather shiny; on the lower surface, sides of prothorax, head and legs there is an admixture of metallic green scales.

Head shiny, almost impunctate, and with a deep round frontal fovea; the eye margins not impressed. *Rostrum* slightly longer than broad, parallel-sided, shiny, and almost impunctate; the interantennal space broadly excavated; the dorsum not sulcate, but with a flattened triangular area on the anterior half and convex behind, with a short lateral impression on each side. *Antennae* with the scape exceeding the eye, scarcely punctate and with fine recumbent hairs and setae; the funicular joints in order of length: 2, 1, 3, 4, (5, 6, 7), the apical joints much longer thar broad, clavate. *Prothorax* a little broader than long, parallel-sided from the base to beyond the middle, thence narrowed and with a slight apical constriction; the basal margin slightly rounded, the apex truncate above and feebly sinuate beneath; the dorsum with a very broad, almost smooth median impression containing a short sulcus, the lateral impression much shallower and uneven, and at the base about half the width of the median one; the two smooth costae with a few very scattered punctures. *Scutellum* very small, rounded and clothed with minute recumbent hairs. *Elytra* rather broadly ovate, sloping shortly from the basal to the humeral angle, the sides slightly sinuate behind the latter and then gently rounded, being broadest a little before the middle; the base jointly and shallowly sinuate, the apices jointly produced and each continued separately as a short obtuse process; the dorsal outline slightly convex, the declivity with a slope of about 45°; the striae shallow and regular, containing large shallow punctures that are partly hidden by the scaling; the suture slightly raised on the declivity, and intervals 3, 5, 7 smoothly costate throughout, the costa on 7 uniting with a short apical costa on 9 and jointly continuing on to the apical process; the irregular setae short flattened and recumbent on the disk, but becoming longer and slightly raised on the apical processes. *Legs* rather slender, with short suberect pale setae; the tibiae finely denticulate internally, the hind pair not mucronate; the second joint of the front tarsi a little longer than broad.

Length, 19 mm.; breadth, 7 mm.

Ecuador: Quito.

Described from a single female.

Another member of the *quadrivittatus* group, but readily distinguished by its more regular rows of punctures and the three sharply defined costae on each elytron.

Genus Xestogaster, nov.

Head with the eyes much less prominent than in *Compsus*, their anterior margins deeply impressed. *Rostrum* with the scrobe not much curved and running to the middle of the eye; the epistome steeply excavated and with the hind margin almost semicircular; the mandibles densely setose, but without scales, the cutting edge not toothed; the mentum with a number of setae on each side. *Antennae* comparatively slender, not squamose; the scape exceeding the eye, gradually clavate; the funicular joints in order of length: 2, 1, 3, 4, (5, 6, 7), all much longer than broad, clavate; the club 4-jointed. *Scutellum* small. *Elytra* with the basal margins obliquely truncate, somewhat raised, and fitting closely to the prothorax; the shoulders projecting but little and very sloping; the apices not produced; stria 10 abbreviated. *Wings* rudimentary. *Legs* comparatively slender and almost devoid of scaling; the tibiae not denticulate, the two anterior pairs strongly mucronate, the hind pair with the corbels broadly enclosed and thinly squamose. *Sternum* with the anterior margin of the front coxal cavities transversely impressed, the coxae placed in the middle of the prosternum; the mesosternum raised into a tubercular prominence between the coxae. the mesepisternum separated from the elytra; the metasternum at its shortest not or but little longer than the middle coxae. *Venter* as in *Compsus*, but bare and very highly polished.

Genotype, *Compsus viridilimbatus* Bovie (1907).

The members of this genus can be distinguished from all their allies by the mesosternal tubercle and the highly polished venter. As indicated above, *Compsus mucoreus* Kirsch (1889), from Peru, probably belongs to this genus.

Xestogaster porosa, sp. n. (Plate III, fig. 3.)

♂♀. Integument black, partly clothed with very pale opalescent green scaling, which is more or less overlaid (especially in the hollows) with yellowish powdering or exudation; the prothorax with scaling in the three longitudinal impressions only; the elytra with a broad stripe of scaling between intervals 3 and 7, elsewhere with the scales in the foveae only (perhaps abraded); the rest of the body and legs bare.

Head with a few very shallow punctures and a small frontal fovea. *Rostrum* evidently longer than its basal width, strongly dilated towards the apex; the interantennal area broadly and deeply excavated; the dorsum gently convex in the basal half and

slightly flattened in front, with a few shallow punctures, the lateral impressions very small and faint or even obsolete. *Prothorax* about as long as broad, parallel-sided from the base to beyond the middle, then rather sharply narrowed and with a shallow subapical constriction; the base subtruncate, the gular margin rather deeply sinuate; the dorsum with a very broad, comparatively even, deep suboblong median impression, and on each side a much narrower curved one extending from the subapical constriction to a little behind the middle, the anterior part being the broadest; the intervening ridges of irregular outline, smooth, and with a few shallow punctures. *Scutellum* a little broader than long, ovate, bare. *Elytra* elongate, parallel-sided from the shoulders to beyond the middle in both sexes, scarcely broader in the ♀, but the apical area more produced and less obtusely rounded than in the ♂; the dorsal outline almost flat from the base to the top of the declivity, the latter with a slope of 60°; the deep rounded foveae in fairly regular rows and becoming much shallower behind, with a tendency to become partly confluent transversely in twos or threes; the intervals quite indefinite and none of them elevated; the scales very small and circular, and no apparent setae except a few at the apex.

Length, 15–17·5 mm.; breadth, 5·25–6 mm.

Colombia: Bogota.

Described from three specimens.

A more parallel-sided insect than *X. viridilimbata* Bovie, and differing markedly in its deeply pitted elytra and the absence of definite carinae; the rostrum is much more dilated at the apex; the prothorax is more abruptly narrowed in front, the median impression is broader and the lateral ones much deeper.

Xestogaster squalida, sp. n. (Plate III, fig. 1.)

♀. Integument black, the elytra alone fairly dense covered with grey scaling, for the most part concealed by an earth-brown indumentum; the rest of the body and legs devoid of scaling.

Head very shiny, with minute close shallow punctures and about a dozen larger ones containing fine recumbent setae; the frontal fovea deep. *Rostrum* longer than its basal width, parallel-sided in its basal half, widened at the apex, and with a few scattered dorsal punctures; the interantennal area very deeply and evenly excavated; the dorsum convex at the base, with a deep triangular median impression in front, and a shallow longitudinal one on each side. *Prothorax* as long as broad, widest at the base and gradually narrowed in front, with a distinct subapical constriction; the base gently

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rounded, the gular margin sinuate; the dorsum covered with rugose wrinkles, the median area shallowly depressed, but not separated from the lateral ones by definite ridges; the basal and apical margins very shiny and almost impunctate, the rest of the surface opaque. *Scutellum* transverse, nearly semicircular, subtruncate in front, bare, and with a shallow transverse impression. *Elytra* elongate, subelliptical, with the sides gently rounded, broadest at the middle, and shallowly sinuate behind the very sloping shoulders; the dorsal outline regularly convex from the base to the top of the declivity, being deepest before the middle, the declivity with a slope of 70°; the dorsum shallowly impressed transversely at the base, the punctures on the disk so shallow, confluent and indefinite as to appear quite irregular and indistinct, the lateral ones small and shallow, but forming more or less regular rows; interval 3 costate at the extreme base, but otherwise there are no raised carinae; the scales very small, elliptical and slightly overlapping; the setae fairly numerous, short, irregular and somewhat raised.

Length, 20 mm.; breadth, 8 mm.

Colombia.

Described from a single specimen.

Allied to *X. viridilimbata*, but easily distinguished by its dull colouring and the absence of smooth costae on the prothorax and elytra; the general form appears more narrowly elliptical owing to the much less prominent shoulders.

Explanation of Plates III, IV.

PLATE III.

Fig. 1. *Xestogaster squalida*, sp. n.
2. *Exorides pyriformis*, sp. n.
3. *Xestogaster porosa*, sp. n.
4. *Compsus armatissimus*, sp. n.
5. *Pseudocyphus marmoratus*, sp. n.
6. *Compsus fractilineatus*, sp. n.
7. ,, *pugionatus*, sp. n.
8. *Exorides corrugatus*, sp. n.
9. *Pseudocyphus sellatus*, sp. n.
10. *Exophthalmodes consobrinus*, sp. n.
11. ,, *crassicornis* Kirsch.
12. ,, *parentheticus*, sp. n.
13. *Compsus zebra*, sp. n.

PLATE IV.

FIG. 1. *Exorides caudatus*, sp. n.
2. ,, *lindigi* Kirsch var.
3. ,, *septemcostatus*, sp. n.
4. ,, *masoni*, sp. n.
5. ,, *pedunculatus*, sp. n.
6. ,, *inflatus*, sp. n.
7. ,, *abruptecostatus*, sp. n.
8. ,, *cylindricus*, sp. n.
9. ,, *marshalli* Bovie.
10. ,, *equatorius*, sp. n.
11. *Compsus adonis*, sp. n.
12. *Exorides obesus*, sp. n.

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VII. *Intersexual forms of* Plebeius argus *L.* (aegon. *Schiff.*),

By E. A. Cockayne, D.M., F.R.C.P.

[Read March 1st, 1922.]

Plates V–IX.

In 1916 I published a paper in the Transactions of this Society on *Agriades coridon* Poda, ab. *roystonensis* Pickett. This year through the kindness of a fellow-entomologist I was enabled to visit a colony of *P. argus* in one of the home counties, where a corresponding gynandromorphous or intersexual form occurs.

Geographical Range.

Long series of intersexes of *argus* of this kind existed in the Briggs and Sidney Webb collections from Dover, where it was taken as early as 1864 and as late as 1889. A specimen was recorded from the New Forest (Proc. Ent. Soc. Lond., 1872, p. xliii), and another was taken in the same district by Clark (Entomologist, 1897, xxx, p. 179).

W. Castle-Russell took a considerable number in Surrey in one small locality (Ent. Record, 1917, xxix, p. 211). None could be found amongst the *argus* from neighbouring heaths, but I have seen one taken in 1921 in another part of the county.

Max Wiskott figures one from Oberbayern, in which the wings on the left side with male characters measure 10 mm., and those on the right, which are entirely female, measure 12 mm. (Lepidopteren-Zwitter meiner Sammlung, 1897, Taf. iii, no. 16). Alexander Heyne gives a full description of another taken at Wildenhain near Torgau. The left side, heavily sprinkled with blue and with a black border and whitish fringe, measured 10·5 mm., whereas the right side was brown with a brown fringe, and measured 13 mm. There were orange lunules on both hind-wings and the abdomen was female externally. The left antenna was a little shorter than the right (Rev. Ent. Soc. Namuroise, 1901, pp. 23–24).

Gillmer figures one splashed with blue on all four wings taken by Krodel at Würzburg, May 1901. He says that

the penis protruded, but as the abdomen is female it was probably the ovipositor (Ill. Zeitschr. f. Ent., 1902, vii, p. 211).

Oberthür has figured six with large blue patches, or with the whole of the wings blue on the right side, and with a reduction in size of the wings on the same side. The borders of these wings are very dark and the fringes white. One is from Pléchâtel, and five from Monterfil both in Ille-et-Vilaine, France (Lep. Comp., 1920, xvii, Pl. DX).

Specimens from all these localities agree in having blue scales associated with a reduction in the size of the wing, in most cases confined to the wings of one side. In both Dover and Surrey specimens androconia are present amongst the blue scales. Apart from these two species the same form of intersexuality is found in *Agriades thetis* (*bellargus*).

Oberthür figures two, which are very blue and much smaller on the right side than on the left. One is from Digne, 1907, one from Dompierre-sur-Mer, 1908 (Lep. Comp., 1909, iii, Pl. XIX, figs. 69, 70). He has figured seven more, three with large blue patches on the wings of both sides, four with the blue confined to one side. One is from Auzay, Vendée, and six from Dompierre-sur-Mer, Charente-Inférieure (Lep. Comp., 1920, xvii, Pl. DX).

In these three species intersexes are found year after year in certain restricted localities, but I think it will be discovered that they have a wider range than the present records indicate.

Association with excess of Females and ab. *inaequalis*.

In the case of *A. coridon* there is no doubt that where ab. *roystonensis* is fairly common, as at Royston and near Tring, the number of females greatly exceeds that of the males.

At Alton Barnes, where, so far as I know, only two ab. *roystonensis* have been taken, the sexes appear to be equal in numbers, but a small excess of females would easily pass unnoticed. Castle Russell states that in his Surrey locality for intersexes of *argus* the proportion of females to males was at least 100 to 1.

In the colony of *argus*, which I visited, females did outnumber males, but not to the same extent as in *coridon*

at Royston, although the percentage of intersexes was higher. It is possible that the excess of females and the presence of intersexes may be related phenomena, but observations from other localities are needed.

At Royston *A. coridon* ab. *inaequalis* Tutt is met with every year, and I have taken it with ab. *roystonensis* near Tring. This form has blue streaks or large blue patches on one or more wings, often in situations where no blue is found in any female except ab. *syngrapha*. The blue scales are serrated like those of the female or rounded like those of the male, and beneath and around them are scales so deeply pigmented as to appear black or indigo-blue. There are no coarse hair scales and no androconia, nor is there any reduction in size of the wing. In 1920 two or three were taken with the whole of both wings on one side blue of a deeper colour than ab. *syngrapha* Kefers, and with a very black border. These have no androconia and no hair scales. I regard them as extremely fine examples of ab. *inaequalis*. I am inclined also to think that a single specimen from Royston, which has all four wings entirely of this blue, should be regarded as an example of this condition present on both sides instead of unilateral.

Amongst my *argus* are two which resemble this form of *coridon*. In both of them the wings on the two sides are equal in size. One has three streaks of serrated blue scales and black under scales beneath and around them along the costa of the right fore-wing, the other has a short streak of rounded blue scales with many more black ones near the costa of the right fore-wing; but there are no androconia in either. For this aberration of *argus* with one or more streaks of blue scales, but without androconia or inequality in the size of the wings, and with the coloration of the underside, and the abdomen and genitalia like those of a female, I propose the name ab. *inaequalis* ab. nov.

It seems to be much scarcer than the other intersexual form, just as *A. coridon* ab. *inaequalis* is scarcer than ab. *roystonensis*. Its occurrence in both species in the colonies which produce the intersexes, suggests that these forms may be related to one another. On this point, too, further observation is needed.

In the same place I took a very curious specimen. It is a female with wings symmetrical in size and shape, but on the right side the wings are brown except for a few blue scales at the extreme base, on the left they have a large

extent of blue scaling at the base, that on the hind-wing extending almost to the lunules. The blue scales are serrated and there are no androconia. It seems to me to be a true heterochroic specimen like the one from the New Forest described under the name ab. *duplex* Cockerell. This had the wings on the right side brown, those on the left strongly shaded with blue but not reduced in size. According to Tutt it showed on each half a different form of female colouring and was not a gynandromorph (Bond, Ent. Month. Mag., 1872–73, ix, p. 200; Entomologist, 1889, xxii, p. 6).

Four or five females of *coridon*, showing a different kind of female upperside colouring on the two sides, like these two females of *argus*, have been taken at Royston. It seems to me to be more than a coincidence that all have come from localities where the intersexes are found.

Frequency of Intersexes.

Although the colony is compact and isolated, it is difficult to estimate the percentage of intersexes. On two evenings, when I examined females asleep, I took two out of 230 and one out of 175. Allowing for the fact that some intersexes had been captured previously, at least one per cent. of the total number of females must be intersexes. During the daytime I took them at about the same rate as on these two evenings, and I think this estimate is fairly correct. I am sure the percentage of intersexes of *argus* in this colony is much higher than that of *coridon* ab. *roystonensis* at Royston or near Tring.

Habits.

The flight and general behaviour of the intersexes resemble those of females. Twice I saw one being pursued by a male, and it quivered its wings and took up the attitude of a normal female. I am told that a number have been found paired, and my dissections show that this happens frequently. Three of my specimens laid a few eggs and they were laid singly in the usual way. The eggs were fertile and one larva has died after eating a hole in the shell.

External Characters.

All my 58 specimens have androconia mixed with the blue scales even where these are few in number. The blue

scales are nearly all rounded like those of a male instead of being serrated, and they are usually grouped in streaks and patches rather than peppered over the wing as they are in *coridon*. In a very large number blue scales are found in positions where no blue occurs even in the bluest *P. argus* ab. *masseyi* Tutt.

Blue scales often completely replace the orange of the lunules in the fore- or hind-wing and extend beyond the lunules. In some a few blue scales are found amongst the orange ones, or a thin stripe of blue runs right through a lunule. This unusual extension of blue outwards was noted in 46 of my series and probably is present in others. In intersexes with much blue near the margin the margin is blackened like that of a male and the fringe is white, or there are white patches in it. This is clearly visible in the figures. Thus the following male characters may be present :—

(1) androconia,
(2) rounded blue scales often situated in places where no blue is present in the bluest females,
(3) black margin,
(4) white fringe.

The underside is nearly always entirely female in coloration. The reduction in size of the blue-scaled wings is less than in *coridon* unless the blue scaling is very extensive. One specimen, however, has a very small left hind-wing without any blue scales, and a left fore-wing with a blue streak and only a small indentation of the margin adjoining it. In two specimens the antenna on the side with male characters is smaller than the other. Fifty-four specimens have blue on one side only; nineteen of them have blue on one fore-wing only, three on one hind-wing only, and thirty-two on both wings. Four have blue on the wings on both sides, two of them on all four wings, one on both hind-wings and the right fore-wing and one on both fore-wings. There is a higher proportion of specimens with a bilateral distribution of blue scales and androconia than in *coridon*. I have seen three taken in 1918 with all four wings nearly blue all over, so that the appearance of the upperside was much more that of a male than a female. I have one taken at Dover in 1889 exactly like a male on the upperside except for small patches of orange scales representing part of lunules 1, 2 and 4 on the left

hindwing and 2 and 4 on the right. Even the underside is like that of a male, but the abdomen has no long hairs and has female genitalia (Pl. VI, fig. 3).

Anatomy of Internal and External Genitalia.

I dissected 26 intersexes and 29 normal females as controls, but most of these came from the same colony and there may be more than the average amount of variation amongst them. In every case the external genitalia, ovipositor and rods were normal and no trace of any male structure was found. The prop and rein with the chitinous apparatus for the attachment of the muscles which extrude them were normal. In these respects they agree with intersexes of *coridon*.

The bursa copulatrix with its caput was always present, but showed remarkable variations in size and shape. The ductus bursae or seminis was invariably present and normal. The spermatheca was present in all cases and had the two dilated portions found in normal females, but the size and shape of these varied a good deal. The cement glands showed abnormalities in two examples. In one, intersex no. 7, of which the abnormal ovaries are figured, the proximal dilated part of each gland was very narrow and short, that on the right being half and that on the left a third the usual size, the distal tubular part being normal. In another the dilated portion was rather narrow and tapering. In the majority the ovaries were large and contained well-developed eggs. Many showed evidence of having laid eggs and had eggs in the common oviducts and vagina. The eggs in these situations lay with their long axes vertical instead of horizontal as in the egg-tubes. Only three had abnormal ovaries.

In intersex no. 7, a specimen with a moderate amount of blue scaling on the right fore-wing, there was a small ill-shaped egg with sculptured shell in the vagina. In the left ovary the outer tube had a single well-developed ovum with normal shell, but the younger ova above were not nearly so far developed as in normal tubes. In the second tube all the ova were very immature. Such a backward development is not found even in newly emerged females, which always have at least two ova in each egg-tube with green contents and sculptured shell. In the third tube the first ovum was aborted and represented only by a few granules. The

fourth tube had one well-developed ovum, and all the rest were very immature and apparently abnormal. In the right ovary in the outermost tube there was not even a dilatation where the first ovum should have been, and the ova actually present were all very backward in development. In the second tube the first ovum was aborted and the rest very immature, in the third tube the first ovum was still more obviously aborted. In the fourth tube the first ovum in the fresh condition was represented by an oval mass of granular material much bigger than a full-sized normal ovum. This owing to lack of density has shrunk in alcohol, and the figure gives a poor idea of its original bulk. In this ovary there was not a single ovum which appeared to be normal (Pl. IX, fig. 5).

In intersex no. 25, a specimen with only a little blue on the left side, there were three ova in the vagina, of which the lowest and highest were normal. The middle one was very small, with dense homogeneous green contents like those of a normal ovum, and with a small crinkled shell with deficient sculpturing. There was a normal ovum in each common oviduct. In the left ovary the lowest eggs were normal, but three are depicted end on owing to twisting of the egg-tube in preparation. They lay with long axis vertical and were moving down the oviduct. The smaller ova were very immature, and not all at corresponding stages of development at corresponding points in each tube, as they are in a normal ovary. In the right ovary in one tube the lowest ovum was small and misshapen, but had dense green contents and a shell small but sculptured. The ovum above it was normal, as were the lowest ova in the next two tubes. The lowest ovum in the fourth tube was absent (Pl. IX, fig. 6). The third abnormal specimen had only three instead of four egg-tubes in each ovary, but the ova were normal. This specimen laid two eggs in captivity. The figure of it gives a good idea of the size of a normal egg-tube for comparison with the small abnormal tubes of the other two (Pl. IX, fig. 4).

The ova with dense green contents indicating maturity are unshaded, the less mature with granular yellowish contents are shaded in all the diagrams.

Amongst the intersexes of *coridon* a specimen with similar ovaries, each with only three egg-tubes, was discovered. In a hundred normal Lycaenids of various species every ovary had four egg-tubes.

The normal bursa copulatrix in *A. coridon* consists of a tube of uniform width ending in an oval dilatation, the caput bursae. It arises from a point slightly below the apex of a rounded chitinous prominence, broader at the base than the apex and flattened in its antero-posterior diameter. This is supplied with muscles for extruding the prop and rein of Chapman. These organs are continuous with the tubular part of the bursa, and at the point of junction the ductus bursae arises. The ductus in *argus* is double the length of the tubular part of the bursa. The first half is narrow and the second half which opens into the vagina is much wider.

In *argus* bursae like those of *coridon* were found in 25 out of 29 normal females, *i. e.* females with no male characters, but only in 8 intersexes out of 26. There were minor variations in the length and width of the tubular part, and in the size of the caput, in specimens which I have regarded as normal.

In the intersexes abnormalities of the tubular part were common. The proximal part of the tube arising from the basal prominence was frequently more or less dilated, and the dilatation extended a variable distance up towards the caput. Then it became suddenly narrower, forming a tube thinner than the tubular part of a normal bursa. This thin part was of considerable length in some and in others formed a mere constriction between the dilated part and the caput. In one there were two constrictions in the tubular part, and in another one constriction in the tube and a second in the caput itself. In one case the bursa was lying very much twisted and the tubular part, narrow at its origin, became gradually wider and then suddenly constricted just below the caput, which was quite transparent. In one specimen, which dried after having been in alcohol, the dilatation became full of air and was seen to have very thin walls. Several appeared to be like this, but in others a narrow inner tube ran down the tubular part of the bursa and the dilated part almost to its point of origin. In a normal bursa this inner tube can be traced from near the point of origin up the tube into the caput, where it expands into an oval termination.

In *Rumicia phlaeas* there is always a short, broad dilatation of the bursa before the narrow tubular part commences, and perhaps this corresponds to the proximal dilated portion of the bursal tube in these abnormal *argus*.

In two specimens the whole bursa was very small and narrow, both the tubular part and the caput, and in another the tube was long and wide and the caput short and broad (Plate I, fig. 8). One had a constriction of the caput as well as a dilatation of the proximal part of the tubular portion.

My figures, which are drawn to scale, show these abnormalities and also the great variation in the total length of the tubular part and in the size of the caput. A shrunken wrinkled caput is probably normal, and merely indicates loss of contents and contraction of the muscle within. The caput has a single layer of cubical epithelium covering the thick chitin, on the inner side of which numerous tracheae run. Inside this is a thick layer of circular muscle fibres.

Four intersexes had a transparent caput and were probably virgins. In many it contained some opaque yellow material like that found in worn normal females. These had probably been impregnated some days before. In several it was full of dense white and brown contents such as I have found in *argus* and *coridon* taken *in cop.* These had been impregnated recently. Amongst the controls two had bursae with a shrivelled, square-ended caput and a narrow tubular part dilating about half-way down into a wider tube. Two others with abnormal dilatations are figured (Plate IX, figs. 1 and 2).

The bursae were examined in most cases immediately after death, and rough sketches made, which agreed closely with the more careful drawings made after preservation in alcohol.

Comparison of the Genitalia of Intersexes of *argus* and *coridon*.

The intersexes of *argus* agree with similar specimens of *coridon* in having normal female external genitalia. Amongst the *coridon* one with small cement glands and one with a bursa constricted between tube and caput were found like some of the abnormal *argus*. In both species a specimen was met with which had only three egg-tubes in each ovary instead of four. But no *coridon* was found with abnormal ova in the ovaries like the two *argus*, and no argus was found with complete absence of bursa and ductus bursae, or with a bifid termination to the spermatheca, which were abnormalities found in *coridon*.

General Remarks.

I think these insects must be regarded as intersexes and not as true gynandromorphs or sex mosaics. Morgan has proved conclusively that the latter are due nearly always to the loss of an X-chromosome occurring usually at the first division of the fertilised ovum. True gynandromorphs of both *coridon* and *argus* are known, and prove that the secondary sexual characters in these species are carried in the X-chromosome. If these insects were due to an abnormality of the X-chromosome one would expect to find male structures in their internal and external genitalia and in their gonads.

True intersexes in Lepidoptera are found in various primary and secondary hybrids, of which a list is given in my paper in the Journal of Genetics. All of them replace females. Nuttall and Keilin have found intersexes replacing females in lice, chiefly in hybrids or crosses between head and body lice.

Goldschmidt has studied intersexuality in *Lymantria dispar* in crosses between strong and weak races. In the first cross between a male of a strong race and a female of a weak race he obtained 50% males and 50% intersexes or 100% males. Half the latter proved to be transformed males and had only one X-chromosome like females instead of two like normal males. Male intersexes, individuals with two X-chromosomes but with some female secondary sexual characters, appeared in later generations. He considers that the intersexuality is due to a difference of potency in the factors for maleness and femaleness in different races of this species.

Sturtevant has found large numbers of sterile intersexes in a race of *Drosophila simulans*. He has given convincing proof that they are females modified by a recessive autosomal mutant gene, which causes them to show male structures. Their sex glands are absent or very minute. He has proved that the male parts have two X-chromosomes in their cells like the female parts. It is interesting that this gene or factor is carried not in a sex chromosome but in an autosomal one. He has shown also that in true gynandromorphs of *D. simulans* the cells of the male parts contain only one X-chromosome.

Bridges has found another kind of sterile intersex in *Drosophila melanogaster*. In these the gonads are rudi-

mentary ovaries, ovotestes or an ovary and a testis. He has shown by cytological examination that these intersexes all possess the second and third (autosomal) chromosomes in triplicate and the X-chromosome in duplicate, and that some have the fourth chromosome in triplicate and some in duplicate, and some have a Y-chromosome and others are without it. He draws the conclusion that in this species the sex is due to a balance between the X and the autosomal chromosomes, the fourth chromosome having genes with a disproportionately large influence in producing male characters. Of the four kinds of intersex differing in their chromosome complex, two were recognisable in their structural characters. Those with a triploid fourth chromosome were mainly male, those with a diploid fourth chromosome were mainly female in structure. Using X for the X or sex chromosome and A for each set of autosomal chromosomes, individuals with 2X : 2A, 3X : 3A and ? 1X : 1A were all females, although in normal *Drosophila* those with 1X are males, those with 2X : 3A were intersexes and those with 3X : 2A or 1X : 3A were sterile females and sterile males respectively. The original brood from which he obtained his intersexes produced 96 females, 9 males and 80 intersexes. Ten per cent. of the females were structurally unlike the rest and these produced more intersexes.

It is evident that intersexes in insects may be produced in different ways and that every case requires special investigation. The intersexes of *Agriades* and *Plebeius* differ in certain respects from any others, notably in the unilateral distribution of male characters in the great majority of them. They appear to have most in common with Bridges' *Drosophila*. In these there was a great excess of females and intersexes over males, and the intersexes themselves were of more than one kind. The Lycaenid intersexes occur in places where females are in great excess over males, and it is not unlikely that the intersexes are of two kinds, a commoner one with reduction of the size of the wings and with blue scales and androconia scattered over them, and a rarer one with no alteration in size of wings, with streaks or large patches of blue scaling but without androconia.

The abnormality of the chromosomes cannot be identical with that of Bridges' *Drosophila*, because in Lepidoptera the female is the sex with only one X-chromosome and

therefore heterozygous for sex, whereas in *Drosophila* the reverse is the case. In Lepidoptera the male determining factor is carried by the X-chromosome and the female determining factor appears to be carried by the autosomal chromosomes. Nevertheless, it seems to me likely that these Lycaenid intersexes possess an unusual number of chromosomes and the number is probably an uneven one. This would explain the restriction of male characters to one side, and might also explain the origin of the females with a different pattern on the two sides.

Summary.

Two kinds of female intersex are found in *A. coridon* and *P. argus*, and in each the male characters are much more often unilateral than bilateral.

The first kind is much commoner than the second and has blue scales, androconia, and other male characters. The wings with male characters are reduced in size. The bluest bilateral ones look more like males than females. The gonads and genitalia are female.

The second kind has no androconia and no male character except blue scales. The blue scales form streaks or large patches, or may in *coridon* cover the whole of both wings on one side except the margins. Very rarely streaks of blue are found on the wings of both sides. A specimen of *coridon* from Royston referred to ab. *syngrapha* is more likely to be a completely blue intersex.

Intersexes of the first kind may be fertile. Those of the second kind have not been tested. There is a great excess of females where these intersexes are found, and females with a different upperside pattern on the two sides have been met with in the same localities. Intersexes in both species occur wild year after year in the same localities, and the geographical range is wide.

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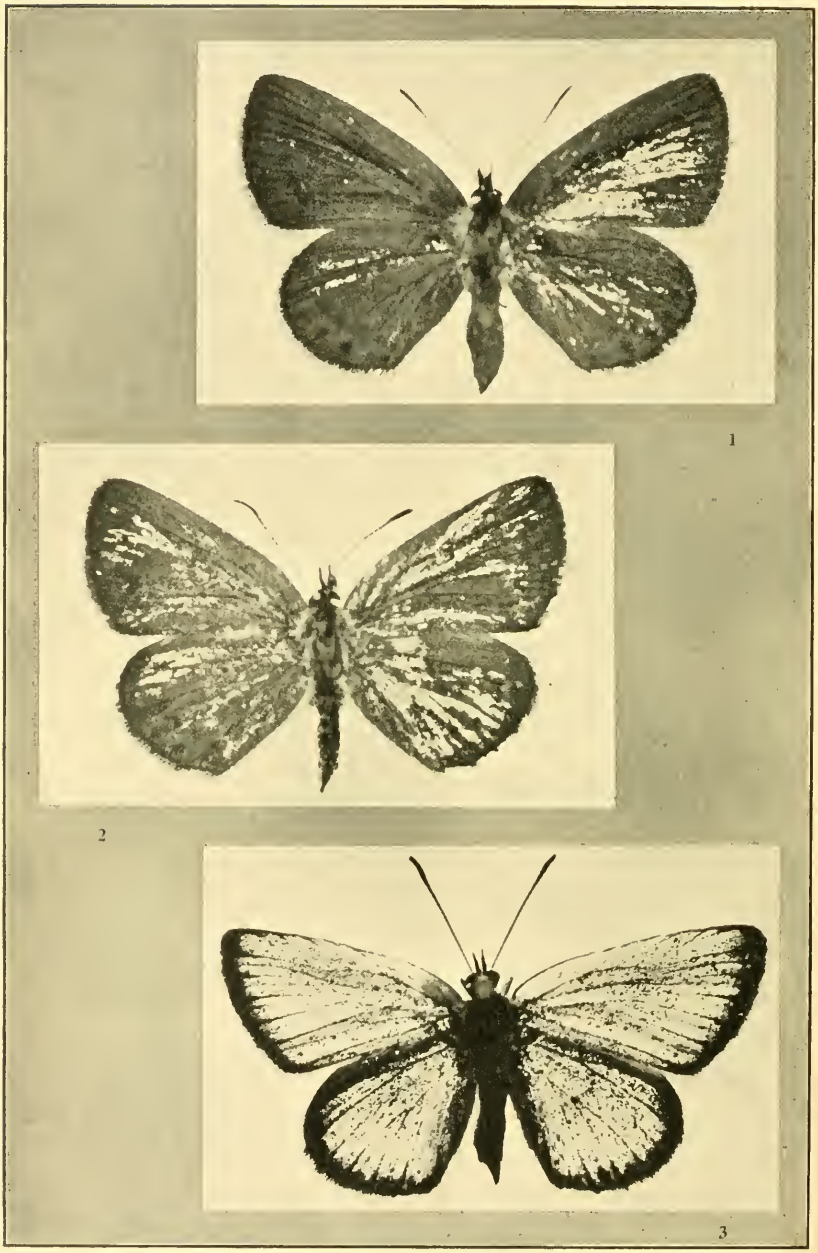
INTERSEXES OF PLEBEIUS ARGUS



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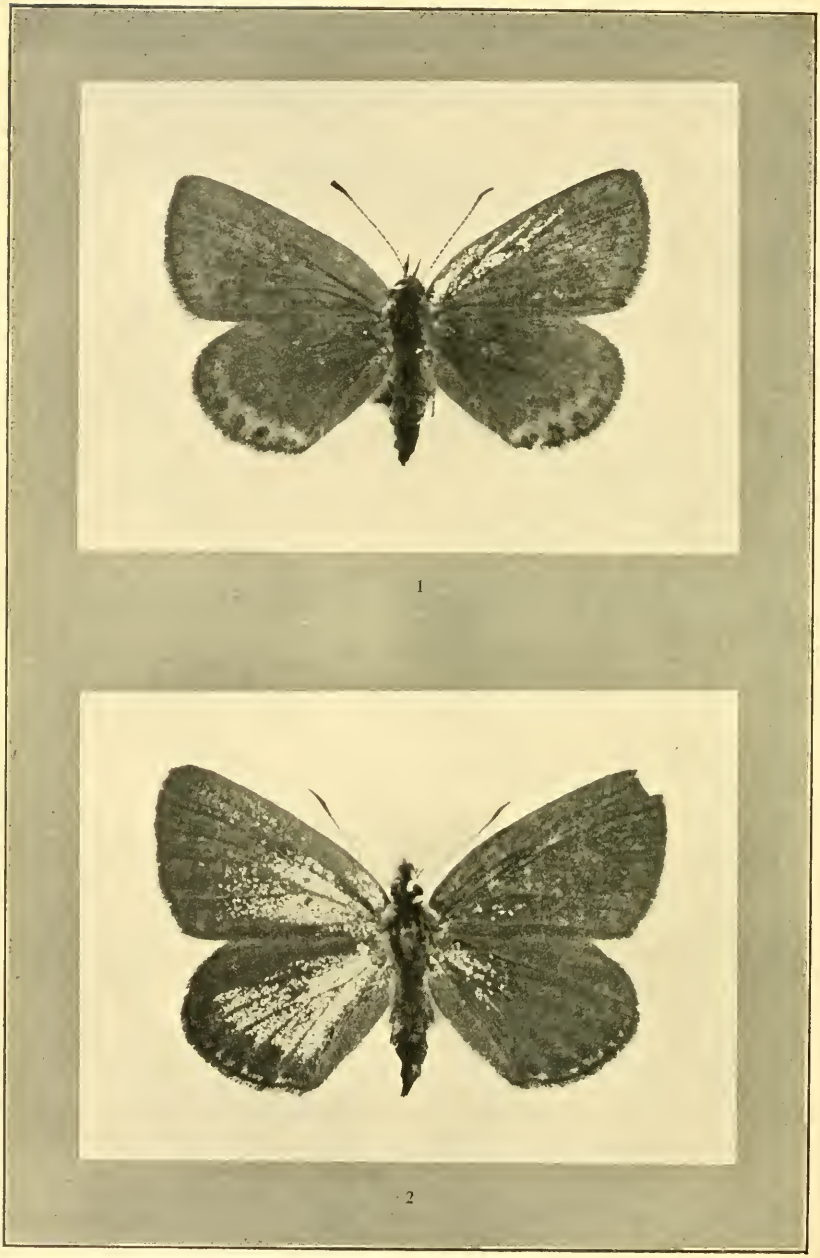
INTERSEXES OF PLEBEIUS ARGUS



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INTERSEXES OF PLEBEIUS ARGUS

Explanation of Plates V–IX.

PLATE V.

Figs. 1 and 2. Intersexes having the wings on the right side smaller with numerous blue scales and androconia, a dark border and a mixture of white and brown scales in the fringes.

Fig. 3. Intersex with the left forewing small and with many blue scales and androconia, a dark border and partially white fringe. The left hindwing is only slightly reduced in size and the blue scales are few in number.

PLATE VI.

Fig. 1. Intersex with blue scales and androconia on the right forewing and both hindwings.

Fig. 2. Intersex with blue scales and androconia on all four wings and with white scales in the fringes.

Fig. 3. Intersex. Dover 1889. The shape of the forewing differs on the two sides. Blue scales and androconia are almost as numerous as in a male, the border in completely dark and the fringes white. Traces of some of the orange lunules are present. The abdomen is female.

PLATE VII.

Fig. 1. Intersex with blue scales on the right forewing, but with no androconia and no reduction in the size of the wing. ab. *inaequalis*, ab. nov.

Fig. 2. Female showing a different kind of female colouring on each side. The blue scales have the usual female distribution and there are no androconia. ab. *duplex*, Cockerell.

PLATE VIII.

BURSAE OF INTERSEXES OF *P. argus.*

FIG. 1. Bursa with gradually dilating tube and shrivelled caput. Intersex no. 16.

2. Bursa with two constrictions. Intersex no. 17.

3. Bursa with dilated tube and sharp constriction near caput. Intersex no. 7.

4. Bursa with very dilated proximal and very thin distal part of tube. Intersex no. 14.

5. Bursa with dilated proximal part of tube. The prominence of right side of caput and crinkling of inner lining are artefacts.

6. Very large bursa with two constrictions, one in the caput.

7. Very small bursa.

8. Bursa with long wide tube and short caput.

9. Bursa with dilated tube constricted below caput and small caput. Intersex no. 9.

10. Bursa with proximal part of tube dilated and distal part constricted. Caput large.

11. Bursa with long dilated and short constricted portion. Intersex no. 18.

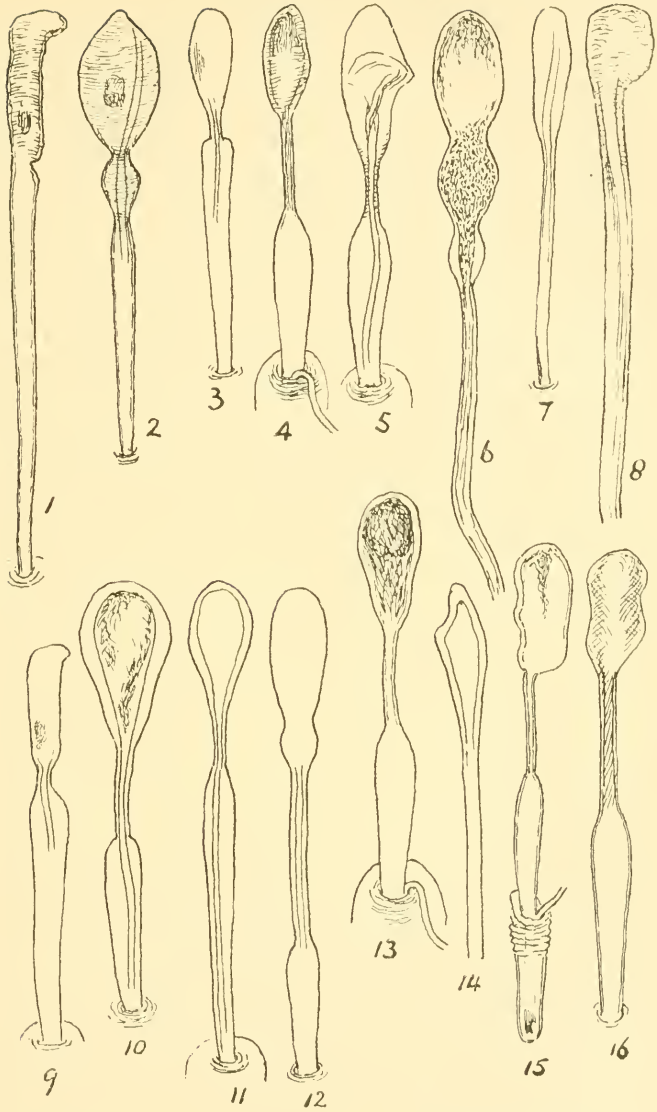
12. Bursa with short dilated and longer constricted parts of tube and constricted caput.

13. Bursa with very dilated proximal and very narrow distal part of tube. Recently impregnated specimen. Intersex no. 14.

14. Bursa with shrivelled caput, probably not abnormal. Intersex no. 4.

15. Bursa with dilated proximal and very narrow distal part of tube. Intersex no. 19.

16. Bursa with dilated proximal part of tube. Intersex no. 8.



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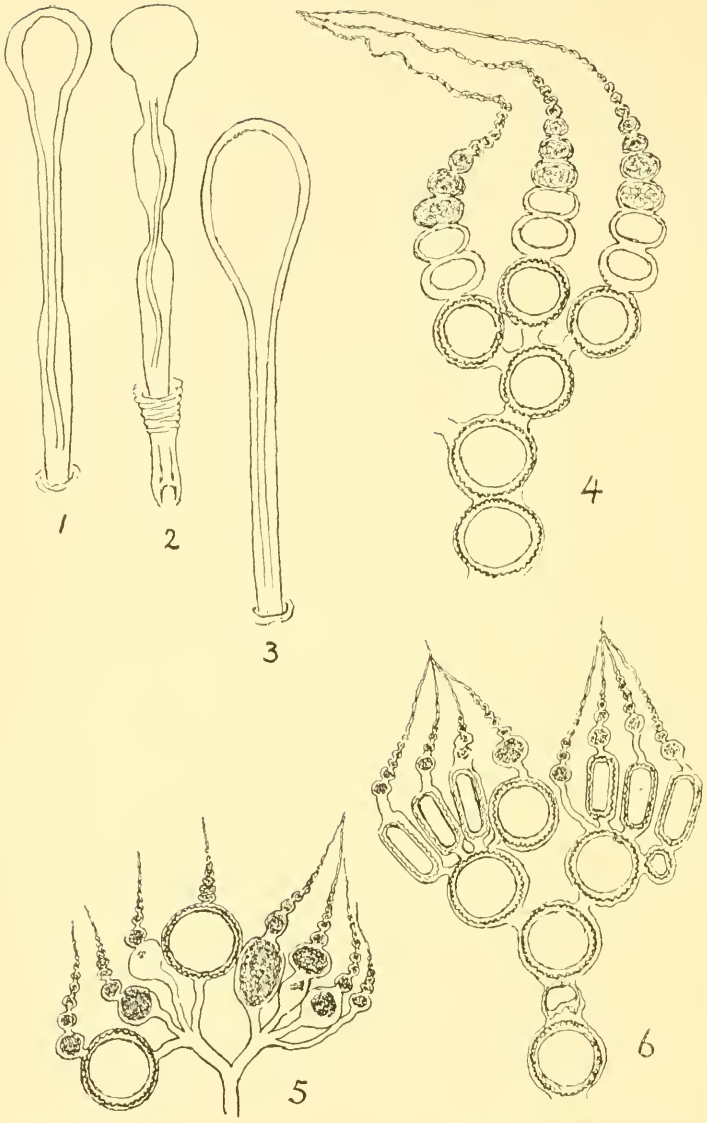
INTERSEXUAL FORMS OE PLEBEIUS ARGUS.
INTERNAL ORGANS.



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INTERSEXUAL FORMS OF PLEBEIUS ARGUS.
INTERNAL ORGANS.

PLATE IX.

FIG. 1. Bursa of control female with slightly dilated proximal part of tube.

2. Bursa of control with two dilatations and two constrictions of tube.

3. Bursa of control with normal tube and caput.

4. Vagina, oviduct and right ovary of intersex with three egg-tubes instead of four in each ovary.

5. Abnormal ovary of intersex no. 7.

6. Abnormal ovary of intersex no. 25.

VIII. *Butterflies on the Nile.* By Herbert Mace. Communicated by Dr. G. A. K. Marshall, F.E.S.

[Read March 1st, 1922.]

The river Nile, apart from the human interest attached to it, because of the plentiful remains of ancient civilisation found on its banks, is particularly interesting to biologists, because it forms the only practical link between the Ethiopian and Palaearctic regions. All the country, including Lower Egypt, lying to the north of the great desert, contains a fauna of Palaearctic character, and there is such a small belt of fertile country bordering the river as it flows through the desert land that only very few forms of life belonging to the respective regions can here intermingle.

Some light is thrown on the manner in which the distribution of species has been brought about, by a study of the butterflies which have been taken by various collectors on the Nile during the last ten or twenty years, and a collection which I have just received from Mr. B. W. Whitfeild, a keen collector, who has been stationed at Khartoum for a year, is of very special interest, chiefly because, unlike those of other collectors, who have generally passed up the river and stayed only a brief time at certain points, the specimens have all been taken within a five-mile radius of Khartoum itself; and although it may be poor in comparison with what an even less thorough entomologist might make in richer parts of the tropics, the collection is much larger than any previously made by a single collector at that place.

All former records have been exhaustively summarised by Dr. Longstaff in a paper published in the Entomological Society's Transactions, June 13, 1913, and a comparison of the insects received from Mr. Whitfeild with those listed by Dr. Longstaff produces some extremely interesting results.

Dr. Longstaff divides the area with which he deals into five parts. Under the first, Lats. 16–14° N., which includes Khartoum, he enumerates 25 species, and under the other sections, each of which includes two degrees of latitude further south, he lists additional species to those in the

first section, the total number thus recorded on the White Nile being 75. This arrangement does not show at a glance the total number of species found in each section, and I have therefore made a fresh analysis of Dr. Longstaff's figures, which I tabulate below.

North Latitude.	Nymphalidae.	Lycaenidae.	Papilionidae.	Hesperidae.	Total.
South of 8	18	6	25	3	52
8–10	13	6	21	3	43
10–12	6	8	21	2	37
12–14	5	8	16	0	29
14–16	4	7	12	2	25

This arrangement shows clearly that the number of butterflies on the White Nile diminishes steadily as the river runs north, the species found in the highest latitude being less than half those of the sub-equatorial district. This is what one would naturally expect, for the upper portion of the river flows through swampy and more varied country, capable of supporting numerous plants, without which insect life cannot be abundant, while the lower portion is all dry desert, with little vegetation other than that immediately bordering the stream.

Mr. Whitfeild's collection comprises a total of 27 species, which I have listed below.

NYMPHALIDAE.

Danaus chrysippus.
,, ,, var. *alcippus.*
Pyrameis cardui.
Precis cebrene.
Hypolimnas misippus.

LYCAENIDAE.

Lampides baeticus.
Tarucus theophrastus.
Catachrysops eleusis.
Zizera lysimon.

PAPILIONIDAE.

Herpaenia eriphia f. *lacteipennis.*
Belenois severina.
,, *mesentina.*
Teracolus calais.

PAPILIONIDAE (continued).

Teracolus phisadia.
,, *protomedia.*
,, *halimede* f. *acaste.*
,, *eupompe* f. *pseudacaste.*
,, *evippe.*
,, *ephyia.*
,, *evarne.*
Catopsilia florella.
Terias senegalensis.
,, *brigitta* (wet and dry season forms).
Colias hyale var. *marnoana.*
Papilio demodocus.

HESPERIDAE.

Sarangesa eliminata.
Gegenes nostradamus.
Rhopalocampta forestan.

The determinations have been made or checked by Captain Riley of the British Museum, whose kindness I gratefully acknowledge. I also have to thank Professor Poulton and Dr. Dixey for their services in settling the identity of a doubtful *Teracolus*.

A few notes concerning some of the above species may be worth recording, either as confirming or supplementing the observations of former collectors.

Danaus chrysippus. Comparatively few of the specimens collected belong to the typical form. Dr. Longstaff estimates that about half the individuals met in the district are of the *alcippus* form, using that term to describe all specimens with more or less white hind-wings. At least 80 per cent. of Mr. Whitfeild's specimens come under this head, but the gradation is very gentle and the majority appear to be about midway between the two extremes. One or two individuals are remarkable for having only white rings round the discal spots. It is worth noting in this connection, that the single female specimen of *Hypolimnas misippus* sent by Mr. Whitfeild mimics the typical *chrysippus*.

Form *dorippus* has not been taken by Mr. Whitfeild, and Dr. Longstaff records only one specimen from the district, so that it would appear not to be common there.

Lampides boeticus. Taken commonly. One extremely small male—22 mm.— is worth mentioning.

Colias hyale var. *marnoana* Rogenh. Found in abundance. Captain Riley tells me these Khartoum specimens have a very distinctive facies and might well be regarded as a local race.

Sarangesa eliminata. Dr. Longstaff says the only record of this species on the White Nile is that of the Swedish expedition, which took two males. The locality is not specified, but he places it under the 14–16 area. Mr. Whitfeild encountered the insect once only, finding a considerable number resting in a fox earth. This singular habitat seems to be general in the genus and has not been explained. I have asked Mr. Whitfeild to make a special effort to learn something further about them.

Only seven of the species recorded from this section of the river are missing from the present collection. In order to make the list complete, I give Dr. Longstaff's records for these.

Chilades trochilus Freyer. One at Khartoum, 1909.

Lycaenesthes otacilia Trimen. One at Soba (Blue Nile, ten miles from Khartoum).

Azanus ubaldus Cramer. Fairly common at Khartoum, 1909, 1912.

Calopieris eulimene Klug. One at Burri, Khartoum, and seven males at Soba, 1909. Six between Soba and Khartoum, 1912.

Teracolus chrysonome. A female near Mogran, Western side of Khartoum, 1909.

Teracolus daira. One male at Khartoum, 1909. One between Soba and Khartoum, 1912.

Teracolus liagore Klug. A very scarce butterfly. One at Ad Duwem (Lat. 14° N.), 1909. One at Soba, 1912.

There are nine species in the collection which are quite new to this district. These are—

H. eriphia.	Previously recorded not higher than Lat.						13° 16′ N.
B. severina.	,,	,,	,,	,,	,,	,,	11° 0′ N.
T. calais.	,,	,,	,,	,,	,,	,,	13° 16′ N.
T. phisadia.	,,	,,	,,	,,	,,	,,	13° 22′ N.
T. evippe.	,,	,,	,,	,,	,,	,,	13° 22′ N.
T. evarne.	,,	,,	,,	,,	,,	,,	12° 37′ N.
T. senegalensis.	,,	,,	,,	,,	,,	,,	12° 45′ N.
T. brigitta.	,,	,,	,,	,,	,,	,,	9° 30′ N.
R. forestan.	,,	,,	,,	,,	,,	,,	10° 0′ N.

It will be seen that there are six species which were previously known no further north than the 12–14 section, one from the 10–12 section, and two which have never previously been taken lower down the river than 10 degrees N. latitude.

The most striking feature of the collection is the presence of the two species of *Terias*, both of which Mr. Whitfeild has taken quite freely at Khartoum, though the previous record for *senegalensis* is four degrees further south, while the most northerly appearance of *brigitta*, hitherto, was 9 degrees N. Lat. Both are extremely conspicuous insects, not likely to be overlooked by former collectors had they been present. Indeed, Mr. Whitfeild tells me that they are extremely prominent in the lucerne fields by the river, which he finds the most favoured place in the district for butterflies, *Pieridae* in particular being almost confined to them. The great skipper *R. forestan*, a very typical Ethiopian species, of which Mr. Whitfeild took only one specimen, had hitherto been found by only one collector, no less than six degrees further south.

Mr. Whitfeild's theory is that these new species have been brought down the river among the fodder which is constantly being imported. Khartoum is steadily developing and importations of this kind continually increase. He thinks that large numbers of insects in all stages come down the river in this way, and that the increasing area of cultivation makes it possible for many to establish themselves.

It seems a very reasonable conclusion, and is certainly supported by the general distribution of the insects as shown in the above table. Only 19 of the 75 species are found outside the Ethiopian Region, and of these only eight extend into the Palaearctic Region. Of these it may be said that about half are generally considered Ethiopian types and the other half Palaearctic, but in face of the distribution shown by the table, one is led to believe that the greater probability is that all of them originated in Africa and passed down the Nile Valley into the Palaearctic Region. Certainly not more than eight or ten of the whole number can be regarded as Palaearctic forms which have gone south, and it seems to me that the semi-artificial introduction which has taken place during the last few years is only an extension of the natural process by which species have been carried down the Nile and established at favourable points.

IX. *Notes on the Types of Oriental* Carabidae *in the Stettin Museum.* By H. E. Andrewes.

[Read March 1st, 1922.]

On becoming aware last year that the collection of the late Dr. Dohrn was now in the Stettin Museum, I wrote to the authorities there to ascertain if they would send me the types contained in it for examination. This they agreed to do, and Dr. Schroeder has recently been kind enough to send them; I take this opportunity of expressing my thanks both to him and to Dr. Janse, who brought them from Stettin, for their assistance.

Dohrn himself described, so far as I am aware, only three Eastern species, but he sent a number of insects to Putzeys, who described some of them and returned the types. Two species were also described by Chaudoir. I think it possible that other types may eventually prove to be at Stettin, but I have so far only traced twelve. One of these, *Thlibops* (*Scapterus*) *dohrni* Chaud. (Rev. et Mag. Zool. 1863, 117), is a little doubtful and cannot at present be found; Chaudoir does not say whether or not the type was unique, but Putzeys, in his Révision Générale des Clivinides (Ann. Soc. Ent. Belg. 1867, 10), tells us that he had seen two examples, one in Dohrn's collection and one in Chaudoir's. Mr. René Oberthür informs me that the latter specimen is now in his collection. Either one of these might be the type. I have examined the remaining eleven specimens, and, as they do not appear to be at all well known, I give a list of them below, together with such comments as appear necessary. As will be seen, one of these specimens, though labelled as the type, proves not to be the one on which the description was drawn up.

1. **Oxylobus asperulus** Chaud. (Bull. Mosc. 1857, iii, 58; *id.* Mon. des Scaritides (i), 133). A ♀ specimen from Colombo. There is no doubt that this example is the type, for Chaudoir, in his Monograph, says he no longer has it in his possession. The species is not uncommon in Ceylon, and occurs also in South India in the Nilgiri and Palni Hills.

2. **Panagaeus sumatranus** Dohrn (Stett. Ent. Zeit. 1891, 253). After describing this species, which came from Sumatra, Dohrn seems to have come to the conclusion (p. 254) that it was identical with *Microcosmus flavopilosus* Laf. This is not the case, indeed it does not belong to the genus *Microcosmus* at all, but to the genus *Dischissus*. I have compared it with the example of *D. notulatus* F. (Syst. Eleuth. i, 1801, 201; Andr., Trans. Ent. Soc. Lond. 1921, 162), which Mr. Henriksen was kind enough to compare at Copenhagen with Fabricius' type, and can detect no material differences. The last joint of the palpi is not much dilated, and I conclude therefore that Dohrn's type is a ♀.

There is another example from Sumatra in the British Museum, taken at Lampong, and also specimens (not quite agreeing with the type) from Hongkong and Shanghai. Most of the examples I have seen came either from N.E. India, or Burma. The type of *D. longicornis* Schaum (Berl. Ent. Zeitschr. 1863, 84), which is apparently the same species, came from the Nilgiri Hills.

3. **Orthogonius collaris** Dohrn (Stett. Ent. Zeit. 1891, 253; Andr., Trans. Ent. Soc. 1921, 149). This species is confined, so far as is known at present, to Borneo. In my note, quoted above, I identified Dohrn's species with *O. doriae* Putz. (Chaudoir's Essai monographique sur les Orthogoniens, 104 (note)). This proves to be correct, but the type of *collaris* is evidently a rather undeveloped specimen, the elytra being of a light brown colour, whereas there are normally very dark stripes along the suture, striae 2 and 7, and intervals 4, 6, and 9. The examples which I have seen came from Pontianak, Kuching (*J. E. A. Lewis*), Quop in West Sarawak (*G. E. Bryant*), and Moorjawa, Sanga Sanga (*H. D. Jensen*).

4. **Galerita peregrina** Dohrn (Stett. Ent. Zeit. 1880, 291; Andr., Ann. Mag. Nat. Hist. (9), iii, 1919, 480). The type came from Hongkong, and judging by the description, I identified with it *G. birmanica* Bates (Ann. Mus. Civ. Gen. 1892, 385). This latter species was taken by Mr. L. Fea at Bhamo, and has also quite recently been taken by Mr. R. Vitalis de Salvaza in Tonkin and Annam: I have been able to compare with Dohrn's type examples from these localities. In length there seems to be no difference, but the specimens from Burma and Indo-China are a little wider, and the costae on the elytra a

little more sharply carinate. At most they do not form more than a local race of the Chinese species.

5. **Tachys arcuatus** Putz. (Ann. Mus. Civ. Gen. 1875, 744). This specimen was taken by Nietner in Ceylon, and is the only one I have seen. Putzeys' description is not a satisfactory one, and he makes no comparison with any other species.

The colour of the upper surface is dark red, not black, the elytra piceous towards apex; the front red round spot, which he mentions, is non-existent, the hind one is triangular rather than round, and yellow. Joint 2 of the antennae is practically as long as 3. The eyes are very moderately prominent. The frontal foveae are very short and end in a large round puncture a little before mid-eye level. The prothorax is narrow, but nevertheless slightly transverse, the sides very little rounded. The most striking character of the elytra, which Putzeys does not refer to, is the great depth of the first stria, which—except near base and apex—is deeper than in any other species known to me; the arcuate second stria, which recedes from the first in the middle of the elytron, is also very characteristic. The length is quite 3·5 mm.

About the size of *T. eueides* Bates (Ann. Mag. Nat. Hist. (5), xvii, 1886, 153), or a shade larger, colour dark red, not black, joints 5–11 of the antennae fuscous, the apical spot on the elytra smaller and lighter in colour. Head with a wider neck, the frontal foveae punctiform; prothorax less rounded at sides and less contracted behind, the transverse basal sulcus not so deep and formed chiefly by a series of five large punctures; elytra rather more convex, the two pores placed a little closer together, the first stria much more deeply impressed, the second not parallel with it but noticeably arcuate.

6. **Trechus indicus** Putz. (Stett. Ent. Zeit. 1870, 175). Putzeys says at the end of his description, " Mr. de Chaudoir m'en a communiqué un individu unique (♂) comme venant des Indes Orientales, sans autre désignation." The specimen in question is a ♂ and bears a " type " label: on the other hand, Chaudoir was not in the habit of giving away unique examples, there is a locality label " Darj." (Darjiling), and a comparison of the description with the specimen makes it quite certain that this is not really the type, which was no doubt returned to Chaudoir. Mr. René Oberthür, however, tells me that he does not think he has it.

It does not seem to me quite sure that the Stettin example belongs to the species in question, but I have compared it with the description and made one or two notes. Upperside black, elytra distinctly iridescent, front of head piceous, neck, base of prothorax in middle, and scutellary region dark red, antennae and legs testaceous red, palpi testaceous yellow. The tooth of the mentum appears to me to be simple, the palpi, which are intact (deficient in the type), are of the ordinary form, the mandibles are slightly hooked and very sharp at the apex, the second joint of the antennae is distinctly shorter and hardly any thicker than the fourth. According to Putzeys the second dorsal pore on the elytra is situated rather behind the middle, but I can see no trace of it, the only pores present being those near the base and apex of the third interval.

I have seen one other example of the species, from Kurseong, differing only in the deeper striation and punctuation of the elytra. In this example also the tooth of the mentum appears simple, and the second dorsal pore is wanting.

The only other Indian species known of this genus are *T. fasciatus* Motch. (Bull. Mosc. 1851, iv, 506), and *T. championi* Jeann. (Ann. Mag. Nat. Hist. (9), v, 1920, 109). Motchulsky's species, so far as I know, has not been identified, and it seems doubtful if it belongs to the genus at all. Of Dr. Jeannel's species I have cotypes in my collection. Compared with the Stettin example, these are a little smaller and darker, the upper surface shining black, with hardly a trace of iridescence; the head is less contracted behind, the frontal foveae, instead of being gently curved, form a distinct angle, and the joints of the antennae are much shorter; the prothorax is wider, with a deeper median line, especially behind, the posterior transverse impression more uneven; the elytra are a little less convex, narrower, the striae and their punctures less deeply impressed, the outer ones obsolescent, the recurved striole at apex much longer. Striae 3 and 4 sometimes join at apex, but do not join 2; in the Stettin example (from Darjiling) they meet, but do not join 2, whereas in the Kurseong example the three striae run together rather irregularly at the hind dorsal pore. There are in *T. championi* three dorsal pores, all comparatively small and inconspicuous; in the two other examples the middle

pore is wanting, while the front and hind pores are deeply impressed.

7. **Broscosoma ribbei** Putz. (Stett. Ent. Zeit. 1877, 100). A well-known Sikkim species, which does not call for any special comment. The type came from Darjiling.

8. **Pristomachaerus quadricolor** Putz. (Stett. Ent. Zeit 1877, 101). In a recent paper (Proc. Zool. Soc. Lond. 1921, 247) on the Oriental Species of the Genus *Callistomimus*, I identified this species a little doubtfully with *C. eucharis* Bates (Ann. Mus. Civ. Gen. 1892, 305) from Burma. A comparison of the type with some cotypes from the Fea collection enables me to confirm this identification.

9. **Pristomachaerus quadriguttatus** Putz. (Stett. Ent Zeit. 1877, 101). In the paper just referred to I expressed the opinion (p. 238) that Putzeys' species would probably prove to be identical with *Callistomimus chalcocephalus* Wied. This proves not to be the case, nor is it the same as any of the other species referred to or described in that paper. It is to be noted that, although described from Darjiling, it bears the label " Naini Tal." The nearest and indeed a very close ally is *C. jucundus* Andr. (p. 239, Plate I, fig. 2) from the Nilgiri Hills and Kanara. *C. quadriguttatus* is of the same size, and coloured in very nearly the same way. The head differs only in the absence of the smooth area on the vertex; prothorax distinctly narrower, the sides less rounded and only slightly sinuate before base, hind angles less produced, surface a little less coarsely punctate; elytra more deeply striate, intervals of equal width, surface more coarsely punctate, yellow spots larger, the front one extending inwards to stria 6, the hind one to stria 4. In my " key to the species " Putzeys' species will stand next to mine (p. 236).

10. **Amara darjelingensis** Putz. (Stett. Ent. Zeit. 1877, 102). I do not think any author has commented on this species. The type is a ♂, and Putzeys' description, though short, seems accurate; he gives the width, however, as $3\frac{3}{4}$ mm., whereas the type is barely $3\frac{1}{4}$ mm. wide. The head is wide, the eyes flat, the frontal foveae very small, but distinctly impressed, continued backwards as a very shallow groove on each side, so as to form a slight semicircular depression on the vertex. The prothorax is convex, transverse, strongly contracted in front, widening from apex to base, front angles rather sharp, hind angles

slightly rounded, base bordered, but the border obsolete for a short distance close to hind angles, foveae punctiform in front, shallower behind, the outer ones very small, also punctiform, hind marginal pore close to the angle; elytra a little dilated behind, widest at about middle, the striae fine and very finely punctate, slightly deeper towards apex, scutellary striole elongate, no dorsal pores and none at base of first stria.

The species has lately been taken by Mr. H. Stevens at Lachung in Sikkim, the specimens agreeing quite well with the type, but varying in colour from metallic green to dull cupreous.

11. **Calathus amaroides** Putz. (Stett. Ent. Zeit. 1877, 103). The type is a ♂ and measures 9·25 × 3·6 mm., though according to the author the measurements are 10·0 × 4·0 mm. This is exactly the size of a ♀ specimen in the British Museum, also from Darjiling, and the only other example I have seen; it differs from the type only in its rather larger size, and the finer and less clearly punctured striae of the elytra. In the type the antennae, apex of femora, tibiae, and tarsi are brownish red. Putzeys thought the insect looked like an *Amara*, but apart from its colour it appears to me to be of typical *Calathus* shape. The hind angles of the prothorax are not obtuse, but right, though rounded, the basal foveae are very slight; the elytra widen from base to basal third, and thence contract to apex. In all other respects Putzeys' account of the species appears accurate.

X. *On the* Mallophaga *of the Spitsbergen Expedition.** By James Waterston, B.D., D.Sc., F.E.S., F.Z.S., Assistant in the Department of Entomology, British Museum.

[Read May 3rd, 1922.]

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The Mallophaga secured by members of the expedition are few in number, only 28 examples representing 7 species and 5 genera having been placed in my hands for report. The hosts examined were as follows: Hooded Crow, Barnacle Goose, Pink Footed Goose, Grey Phalarope, Purple Sandpiper, Fulmar Petrel, and about one-third of the Mallophaga known from these birds were found.

In the notes given below Harrison's arrangement ("Parasitology," vol. ix, No. 1, Oct. 1916) of the Mallophaga has been followed, while for the hosts the names given in the Rev. F. C. Jourdain's recent paper ("The Ibis," ser. xi, vol. iv, No. 1, p. 159, Jan. 1922) have been adopted.

No sucking lice were, apparently, secured.

MALLOPHAGA.

I. *AMBLYCERA.*

Family MENOPONIDAE Mjöberg.

Genus **MENOPON** Nitzsch.

Menopon lutescens Burm.

Menopon lutescens Burmeister. Handbuch der Entomologie, Bd. 2, p. 440 (1838).

♀. Purple Sandpiper. Klaas Billen Bay (C. S. Elton *leg.*), 15. viii. 1921.

I have followed Piaget ("Les Pédiculines," p. 447, Leide 1880) in interpreting this species, which has a wide range of hosts amongst shore- and sea-birds.

* Results of The Oxford University Expedition to Spitsbergen. No. 9.

Genus **TRINOTON** Nitzsch.

Trinotum anserinum Fab.

Pediculus anserinus Fabricius. Syst. Antl., p. 345 (1805).

(*a*) ♀. Barnacle Goose. Advent Bay (J. D. Brown *leg.*), 26. vi. 1921.
(*b*) ♀. Pink Footed Goose. Sassen Bay (G. Binney *leg.*), 17. vii. 1921.
(*c*) ♂. Grey Phalarope. Liefde Bay (T. G. Longstaff *leg.*), 8. vii. 1921.

(The *Trinoton* is of course a straggler on the last host.)

T. anserinum occurs commonly on various Palaearctic Geese, and, it is said, on members of the Genus *Cygnus* also.

II. *ISCHNOCERA.*

Family PHILOPTERIDAE Burmeister.

Genus **PHILOPTERUS** Nitzsch.

Philopterus corvi Linn.

Pediculus corvi Linné. Syst. Nat., x, p. 612 (1758). 3 imm. Head of Hooded Crow. Norway, Tromsø (H. L. Powell *leg.*), 9. vi. 1921.

Philopterus fusiformis Denny.

Docophorus fusiformis Denny. Mon. Anopl. Brit., p. 84, Pl. 1, fig. 2 (1842).

(*a*) 2 ♀. Bear Island (T. G. Longstaff *leg.*), 16. vi. 1921.
(*b*) 4 imm. Klaas Billen Bay (C. S. Elton *leg.*), 15. viii. 1921.

In both cases on Purple Sandpiper on which this parasite regularly occurs.

Genus **DEGEERIELLA** Neumann.

Degeeriella zonaria Nitzsch.

Nirmus zonarius Nitzsch, in Giebel Zeit. f. ges. Nat., xxviii, p. 374 (1866).

(*a*) ♂. Bear Island (T. G. Longstaff *leg.*).
(*b*) 4 ♂, 2 ♀. Klaas Billen Bay (C. S. Elton *leg.*), 15. viii. 1921.

In both cases from Purple Sandpiper.

Degeeriella actophilus Kell. and Chap.

Nirmus actophilus Kellogg and Chapman. New Mallophaga, iii, p. 78, Pl. VI, fig. 4 (28. ii. 1899).

(*a*) ♀. Bear Island (T. G. Longstaff *leg.*), 16. vi. 1921.
(*b*) ♂, 2 ♀, 1 imm. Klaas Billen Bay (C. S. Elton *leg.*), 15. viii. 1921.

In both cases from Purple Sandpiper. *D. actophilus* is a common parasite of the smaller waders.

Genus **ESTHIOPTERUM** Harrison.

Esthiopterum nigrolimbatum Gieb.

Lipeurus nigrolimbatus Giebel. Insecta Epizoa, p. 233, Leipsic (1874).

3 ♀. Fulmar Petrel. Bear Island (J. D. Brown *leg.*), 16. vi. 1921.

An abundant parasite of Fulmars both in the Pacific and in the Atlantic.

Host List with Parasites.

Corvus cornix cornix Linn.

Philopterus corvi.

Branta leucopsis Bechst.

Trinoton anserinum.

Anser brachyrhynchus Baillon.

Trinoton anserinum.

Phalaropus fulicarius jourdaini Iredale.

Trinoton anserinum.

Erolia maritima maritima Brünnich.

Menopon lutescens.
Philopterus fusiformis.
Degeeriella zonaria.
Degeeriella actophilus.

Fulmarus glacialis glacialis Linn.

Esthiopterum nigrolimbatum.

British Museum (Nat. Hist.), Feb. 1921.

XI. *On the Species of the Genus* Larinopoda *Butler.* By H. Eltringham, M.A., D.Sc., F.Z.S.

Plates X, XI.

[Read May 3rd, 1922.]

The genus *Larinopoda* was founded by Butler in 1871 (Trans. Ent. Soc. p. 172, 1871). Doubtless at that time the classification of the Rhopalocera on the structure of the feet was not generally understood. In any case, Butler seems to have had some difficulty in placing the genus, and states that though "evidently belonging to the Pierinae" it seems to be intermediate between *Eronia* and *Deloneura*. He states that its "natural position in the Pierinae is between *Nepheronia* and *Euchloe*."

His description of the genus is as follows :—

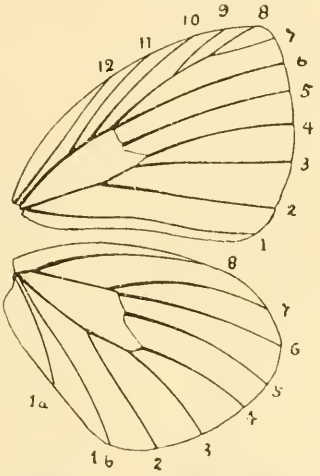
"Wings pyriform; front wings with five subcostal branches, the first emitted at a short distance before the end of the cell, the second immediately before the end, the third half-way between the cell and apex; the fourth and fifth at two-thirds the distance from the cell to the apex; upper discocellular short, slanting obliquely inwards; lower three times the length of upper, angulated, slanting obliquely outwards; median branches emitted near together; hind-wings with subcostals emitted close together, so as to reduce the upper discocellular to a point; lower discocellular very oblique, about eight times the length of the upper; second and third median branches emitted at about half the distance from each other that exists between the second and first; body short, robust; abdomen swollen beneath; legs thick, antennae short, slender, feebly clubbed; palpi long, slender, not hairy."

The type of the genus is given as *Larinopoda lycaenoides*, but the same insect had been described by Hewitson five years previously as *Liptena lircaea*. It is rather remarkable that Hewitson recognised this species as a Lycaenid and in the same year not only placed the species now known as *Citrinophila erastus* amongst the Pierinae, but exhibited considerable annoyance when its real affinity was pointed out by the late Roland Trimen. (See Proc. Roy. Soc. B. vol. 91, 1920, pp. xxiv, xxv.)

Smith and Kirby mention the genus again in 1887 (Rhop. Exot. Lycaen. vol. 1, Oct. 1887), referring it to the Lycae-

nidae, but they immediately proceed to include in the genus species of *Pentila* and *Liptena*, the neuration of which does not agree with that of *Larinopoda*. The neuration is correctly illustrated by Röber (Staud. & Schatz, Exot. Schmett. pl. 50, 1892) and also in the accompanying text figure.

Larinopoda belongs to that section of the Lycaeninae in which there is no precostal nervure in the hind-wing, a character which distinguishes it from *Alaena*, *Pentila*, and *D'urbania*. Nervures 6 and 7 in the h.-w. do not arise from a common stalk, thus distinguishing the genus from



Mimacraea, *Pseuderesia*, *Citrinophila*, *Eresina*, and *Argyrocheila*.

Its further characters as given by Aurivillius (Rhop. Aeth, p. 253, 1898) are as follows :—

F.-w. nervure 6 arises from the end of cell, the f.-w. has 12 nervules, the inner margin of the h.-w. is straight or slightly convex. The cell of both wings is posteriorly sharply edentate so that the posterior angle is projecting, especially in h.-w. The lower discocellular of the h.-w. is very long, straight or somewhat bent outwards. Nervures 3 and 4 of the h.-w. always widely separated at origin. The two antepenultimate abdominal segments in the female hemispherically swollen.

At present the genus is known to contain only a few species of small white or cream-coloured butterflies with

shaded or black markings. They are all found in the Ethiopian Region and are principally of W. African origin. Specific diagnosis on the somewhat feeble external characters is unsatisfactory, and I have therefore endeavoured to rearrange the known forms in accordance with the structure of the male armature.

This organ is of a rather complicated type. To give illustrations of the whole apparatus in each case would be misleading, since the slightest difference in the point of view would suggest differences of structure not really existing. Indeed, a considerable experience of these organs in different genera convinces me that the person actually making the preparations is probably the best qualified to judge of differences and resemblances.

Careful dissection under the stereoscopic microscope gives a general impression of structure, and above all of relative position. The ultimate preparations should be mounted in cells so that they are not distorted by pressure, and for purposes of illustration good drawings are always preferable to photographs, since the latter convey little or no impression of relative position. At Pl. X, fig. 2, I have drawn the entire apparatus taken from a form of *Larinopoda aspidos* f. *brenda*. There are two claspers the distal ends of which are characteristically lobed, the uncus is blunt and bifid, and below it there are two hooks more clearly shown in fig. 3, which is a posterior view of this part in *L. tera*. Each clasper, near the proximal end and on its lower side, has a small chitinous projection which appears to be attached by strands of rather tough connective tissue to a ventral projection on the aedeagus. The latter is a rather unusually shaped organ, the duct enters it more or less in the middle, and the part more proximally situated is apparently in the form of a lever.

The uncus and claspers are connected by webs of tough membrane not shown in the figure.

After some experiment I have decided that the best type of illustration for exhibiting the specific differences between the armatures in this genus is a dorsal view of the two claspers placed as nearly as possible in their natural position. For this purpose the rest of the armature is cut away and the claspers left with their natural membranous connection and mounted in that position in a cell. The remaining illustrations are all drawings of the claspers taken from this point of view.

On the posterior end of the thorax just above the attachment of the abdomen there appears to be a membrane divided into two nearly circular tympana. Whether this is merely the structure of that part of the thorax or is an organ comparable to the thoracic tympanum in Geometridae, Uranidae and other moths, I am unable to decide until I can obtain material in a proper condition for dissection.

KEY TO SPECIES AND FORMS OF *LARINOPODA*.

H.-w. beneath with a spot in cell. (*a*).
H.-w. beneath without a spot in cell. (*b*).
(*a*) H.-w. beneath with delicate undulating shading. . . . . *tera*.
H.-w. beneath without delicate undulating shading . . . . *curema*.
(*b*) H.-w. beneath with dark border, broad and even or broken into more or less triangular spots, or even merely suffused. (*c*).
H.-w. beneath without dark border. (*g*).
(*c*) Ground-colour cream white, h.-w. border broken into triangular spots. (*d*).
Ground-colour chalk white, h.-w. border not broken into triangular spots. (*e*).
(*d*) H.-w. beneath with submarginal spots. . . . . *lircaea* f. *spuma*.
H.-w. beneath without submarginal spots. . . . . *lircaea* f. *hermansi*.
(*e*) H.-w. beneath with submarginal spots. *aspidos* f. *brenda* (*part*).
H.-w. beneath without submarginal spots. (*f*).
(*f*) H.-w. above with broad dark border. *aspidos aspidos*, ♂.
H.-w. above without broad dark border. . . . . *aspidos aspidos*, ♀.
(*g*) Ground-colour creamy white . . *lircea*.
Ground-colour chalky white. (*h*).
(*h*) H.-w. with submarginal spots. (*i*).
H.-w. without submarginal spots. *lagyra*.*

* Occasional examples of *aspidos* female have hardly any brownish scaling beneath and are very difficult to distinguish from *lagyra*. Generally, however, at least a few such scales can be distinguished.

(*i*). H.-w. beneath with brownish dusting at inner angle . . . . *aspidos* f. *brenda* (*part*).
H.-w. beneath without brownish dusting at inner angle. . . . *lagyra* f. *punctata*.

Larinopoda lircaea. Pl. X, fig. 1, Pl. XI, fig. 6.

Hew., Exot Butt. (*Pentila and Liptena*), pl. 1, f. 10, 11 (1866); Staud., Exot. Schmett., 1, p. 268, pl. 94 (1888); Smith and Kirby, Rhop. Exot., 24, Lyc. Afr., p. 95, pl. 21, f. 10 (1893); Auriv., Ent. Tidskr., 16, p. 199 (1895); Rhop. Aeth., p. 272 (1898); Strand, Archiv. f. Natursgesch. Abt., 12, p. 133 (1913); Auriv., in Seitz, Macrolep., p. 329, pl. 63*d* (1914–18).

= *lycaenoides*. Butl., Trans. Ent. Soc. Lond., p. 173, pl. 7, f. 2–5 (1871).

Nigeria. Gaboon. Cameroon. Congo. Angola. Bahr-el-Ghazal.

lircaea ab. *alaenica*. Strand, Archiv. f. Natursgesch. Abt. A, 12, p. 133 (1913).

Spanish Guinea (Alen Benito).

lircaea ab. *alenicola*. Strand, *l.c.*

Spanish Guinea (Makomo Campo).

lircaea ab. *benitonis*. Strand, *l.c.* p. 134.

(Alen Benito).

lircaea ab. *makomensis*. Strand, *l.c.*

(Makomo Campo).

lircaea ab. *simekoa*, Strand, *l.c.*

Cameroon (Simekoa).

lircaea ab. *bibundica*. Strand, *l.c.*

Cameroon (Bibundi).

lircaea f. *hermansi*, Auriv., Öfvers. Vet. Akad. Förhl., 53, p. 435 (1896); Rhop. Aeth., p. 273 (1898); in Seitz, Macrolep., p. 329 (1914–18). Pl. X, fig. 2 (*prox.*).

Congo (Uhangi R.).

lircaea f. *spuma*, Druce, Proc. Zool. Soc. Lond., p. 361 (1910); Auriv., in Seitz, Macrolep., p. 329, pl. 63f. (1914–18). Pl. X, fig. 3.

Cameroon (Bitje, Ja River).

lircaea f. *innocentia*. Gaede, Int. Ent. Zeit. Guben, 9 Jahrg., No. 21, p. 111 (1916) (as *Larynopoda*).

Cameroon (Dengdeng).

lircaea lircaea.

Exp. 40–50 mm. Sexes not specially differentiated in pattern. Ground-colour creamy white. F.-w. costa slightly blackened at

base, the dark scales reduced to a very fine line a little beyond middle. Apex with sepia scaling forming a border about 1·5 to 2 mm. wide at apex, with a tendency to invasion of the ground-colour on nervule ends. This apical darkening extends as far as nervule 3. H.-w. all cream white.

Underside. F.-w. much as above but apical dark colour reduced to faint subtriangular marginal marks or even to a fine marginal line. On costa, just above cell end, a well-defined subtriangular, almost black mark, its base on costa. H.-w. with a rounded sepia black submarginal spot in 6, and a small similar spot in 1*c* opposite origin of nervule 2.

There is a certain amount of variability in more or less typical forms of this species, especially in the extent of the f.-w. apical blackening. The costal black varies in width and is sometimes rather sharply cut off opposite cell end. It can be distinguished from other species except *tera* by its cream-white ground-colour, and *tera* has a spot in h.-w. cell beneath. Strand has described and named several variations. Whether they all really belong to the present species it would be impossible to say without examination, but as the descriptions are published I give a short account of them here.

lircaea ab. **alenica.**

F.-w. apical black 3 mm. wide at apex and reaches beyond nervule 2.

lircaea ab. **alenicola.**

F.-w. apical black 4 mm. broad at apex but does not reach 2, its inner edge somewhat dentate. Beneath, apex and margin suffused with greyish. H.-w. beneath with two black quadrate spots near anal angle. In female the f.-w. black reaches inner margin, and in h.-w. underside there is in all areas an obsolescent black submarginal spot. In cell a minute black dot.

I think it extremely improbable that this is a form of *lircaea* at all. It is probably a variety of *eurema*.

lircaea ab. **benitonis.**

Apical band as in *alenicola*. The black marginal band in basal half of costal area is slightly broader and square cut at end. Underside of h.-w. with six distinct black submarginal spots.

lircaea ab. **makomensis.**

Apical band 3·5 mm. broad and extending backwards to 2. H.-w. with black marginal band of ·5 mm. but increased to 1 mm. at apex, and similar on both sides, below with dark grey spots in 1*c*, 2, 4, and 5. Black marginal band in basal half of f.-w. costa not square cut at end.

lircaea ab. **simekoa.**

Resembles Kirby and Smith's figure of *lircaea* female, but marginal band not quite so broad, and more pointed posteriorly. The black quadrate costal spot merely indicated. Underside differs considerably from the figure alluded to, in that the apical and marginal border, though nearly as broad as above, is only a little darkened, without distinct apical spots, whilst in h.-w. submarginal spots are present in 1*c* to 5, in addition to the usual large black spot in 6.

lircaea ab. **bibundica.**

Both sides pure white. Apical band at apex 3·5 mm. broad, ending in a line shortly beyond 2. On underside this band shows through somewhat. A small black spot at apex, and the costal spot projects sharply. The costa between this and base merely lined with black. H.-w. below with only the two usual black spots.

This form is probably a variety of *lagyra*.

lircaea f. **hermansi.**

Ground-colour cream white. F.-w. costa rather narrowly black, usually suddenly narrowing to a line opposite anterior angle of cell, and then widening into a dark apical border, 4–6 mm. wide, which, gradually diminishing in width, extends round margin to the hind angle. H.-w. with a marginal black border 2–3 mm. wide, invaded by the ground-colour at nervule ends so that it has a dentate or subtriangular appearance in the internervular spaces.

Underside. F.-w. as above but dark markings paler, and a well-marked black subquadrate spot on costa opposite end of cell. H.-w. as above but with a large rounded spot in 6, and a spot in 1*c* opposite origin of nervule 2.

lircaea f. **spuma.**

Resembles f. *hermansi*, but has a submarginal row of spots on underside of h.-w.

In the Tring Museum there is a remarkable form of *hermansi* labelled "Tambura, S. Bahr el Ghazal," in which the dark borders, though greyer, are much extended. That of the costa reaches to the subcostal, and the apical darkening, though barely reaching the hind angle, is 8 mm. wide at apex. The h.-w. hind-marginal border is 3 mm. wide, and above shows little indentation. Beneath, the h.-w. shows no trace of submarginal spots, and the usual rounded spot in 6 is merged in the dark border. This is the only example I have seen from this locality, and curiously enough there is also one example of *lircaea lircaea* bearing the same label, and it is quite typical, though if anything with rather less black at f.-w. apex. It would be interesting to have more specimens from this locality. The armature of the *hermansi* form is the same as in the other examples. The *lircaea* form is a female. When Druce described his *Larinopoda spuma* he added that it might be a form of *lircaea*, though he does not give any reason for the suggestion. I have not found in collections any examples of *lircaea* from localities agreeing with those of *spuma* and *hermansi* except the two specimens from Bahr el Ghazal above mentioned. The armatures of *lircaea* and *hermansi* are not distinguishable from each other or from that of *spuma*, though easily recognised as different from those of the other described species, and I am satisfied that these three forms are specifically identical.

lircaea f. innocentia.

Described as resembling Strand's *makomensis*, but differing from all other forms of *lircaea* in the smallness of f.-w. costal spot and the spots in h.-w. 1c and 6. All other markings absent.

Larinopoda eurema. Pl. X, fig. 10; Pl. XI, fig. 5.

Plötz, Stett. Ent. Zeit., 41, p. 199 (1880); Smith and Kirby, Rhop. Exot., 11, p. 38, pl. 9, ff. 7, 8 (1890); Auriv., Rhop. Aeth., p. 273 (1898); in Seitz, Macrolep., p. 329, pl. 63 f. (1914–18).

♂ = *varipes*. Kirby, Ann. Nat. Hist., (5), 19, p. 363 (1887); Smith and Kirby, Rhop. Exot., 2, pl. 2, ff. 5, 6 (1887).

= *libussa*. Staud., Exot. Schmett., 1, p. 268 (1888).

Africa, W. Coast. S. Leone to French Congo.

Typical examples may be thus described :—

Exp. about 40 mm. ♂ chalky white. F.-w. with costa rather broadly blackened, slightly wider at cell end, then narrower, and again widening out into apical black which is about 6 mm. wide at apex, and continues in a gradually narrowing hind-marginal border to hind angle.

H.-w. with a marginal black line and within this a dusting of sepia black scales, slight at apex but considerably extended at ends of areas 3 and 2. Black spots of underside showing through rather conspicuously.

Underside. F.-w. as above but dark markings paler. A costal spot above end of cell at which costal black abruptly terminates.

H.-w. with margin as above. In 6 a sub-marginal rounded dark spot and often a minute one above it in 7. A small rounded spot in 1c opposite origin of nervule 2, and a larger conspicuous black spot in cell, and sometimes a second minute one above it. ♀ like the ♂ but with only a dark marginal line on h.-w., and reduced dusting of dark scales beneath.

The amount of sepia black scaling in this species varies in both sexes, and minute additional spots sometimes occur on the underside. A male example from Kumassi has nearly as much dark marginal border as *aspidos*, and on the underside there is a second small dark spot beneath that in h.-w. 6.

In some females the dark scaling is reduced to a mere greyish suffusion, but in all the 44 examples before me the spot in h.-w. cell beneath is constant, and this serves to distinguish it from other species except *tera*, from which it can be separated by the pure chalky whiteness of the underside.

The species is very closely allied to *aspidos*, and there is but little difference between the male armatures.

Larinopoda aspidos. Pl. X, figs. 7, 8; Pl. XI, fig. 4.

H. H. Druce, Ann. Nat. Hist., (6), 5, p. 25 (1890); Karsch, Berl. Ent. Zeit., 38, p. 215 (1893); Auriv., Rhop. Aeth., p. 273 (1898); in Seitz, Macrolep., p. 329 (1914–18).

Togoland. Nigeria (Lagos, Benin).

f. *latimarginata.*

Gr. Smith, Novit. Zool., 5, p. 354 (1898); Auriv., Rhop.

Aeth, p. 273 (1898); in Seitz, Macrolep., p. 329, pl. 63 f. (1914–18).

Nigeria (Warri, Lagos).

f. *brenda*. Pl. X, fig. 9; Pl. XI, fig. 2.

H. H. Druce, Ann. Nat. Hist., (7), 11, p. 69 (1903); Auriv., in Seitz, Macrolep., p. 329 (1914–18).

With type form.

Exp. about 40 mm. ♂ chalky white. F.-w. with sepia black on costa extending rather beyond end of cell, where the dark colour widens into a black subapical and marginal-border 5–8 mm. wide at apex, gradually narrowing to hind angle, where it is 2–3 mm. wide. H.-w. with a dark border of fairly even width (about 2–3 mm.) extending from apex to anal angle.

Underside with sepia black markings as on upperside. F.-w. with a black dentate mark about middle of costa and h.-w. with a round black spot opposite origin of nervule 2, and a larger submarginal spot in 6, often merged into the black border.

♀ variable, but with less black than in ♂. Generally only with a blackened f.-w. apex, and little or no black beneath except the f.-w. costal spot and the two spots on h.-w.

f. brenda.

In this form, the type of which is a male, the upperside has the appearance of the female of the typical form. Beneath, the f.-w. has the costa rather broadly black as far as end of cell, where the dark colour is somewhat abruptly terminated by the dentate costal spot. Apex paler than on upperside. H.-w. with the usual spots in 1c and 6, but with a row of delicate submarginal marks in the internervular spaces in 1c to 5, that in 1c doubled. Hind and inner margins with a fine black line.

f. latimarginata.

Appears to differ from typical *aspidos* only in that the dark h.-w. marginal border beneath is continued, though more narrowly, along the inner margin. Probably Grose Smith had not seen *aspidos* when he described this form as a species, but it is difficult to understand why Prof. Aurivillius keeps it as a separate species in Seitz's work. It occurs commonly in long series of the type form from Lagos.

The Hope Department possesses long series of *aspidos* taken near Lagos by Mr. Lamborn. Several pairs were taken *in coitu*, and the female is always much less black

than the male. There is, however, considerable variation, and some females have the h.-w. underside much darkened along the margin, especially at anal angle, and where this marginal darkening is obsolescent a submarginal series of spots remains. Some females have also a darkened h.-w. margin on upperside, but apparently never so complete a border as in the male. There is variation from the typical male to the *brenda* form, some males having a reduced blackening on the h.-w. margin. The *brenda* form seems really to be a male with the pattern of the female, the black h.-w. border being practically absent above and reduced to submarginal spots beneath. Occasional female examples are all white above with the f.-w. apices merely greyish. The species and probably the whole genus would appear to be very distasteful, as they are very easily caught, and in fact can be picked up with the fingers.

Larinopoda tera. Pl. X, figs. 11, 12; Pl. XI, figs. 1, 3.

Hew., Ent. Mo. Mag., 10, p. 125 (1873); Auriv., Rhop. Aeth., p. 273 (1898); Neave, Proc. Zool. Soc. Lond., p. 43 (1910); Auriv., in Seitz. Macrolep., p. 329, pl. 63 f. (1914–18).

= *soyauxii*. Dew., Nov. Act. Acad. Nat. Cur., 41, 2, p. 201, pl. 26, f. 10 (1879); Smith and Kirby, Rhop. Exot., 15, p. 51 (1891); pl. 12, f. 9, 10, (as *soxauxii*) (1891); Auriv., Rhop. Aeth., p. 273 (1898).

Cameroon to Uganda.

Exp. 30 to 40 mm. Sexes not markedly different. Typical examples are white or dusky white. F.-w. dusted with sepia on costa and with a sepia brown apical patch some 6 mm. wide at costa and gradually narrowing posteriorly, sometimes reaching hind angle but generally ending in 2. H.-w. often brownish at inner angle and the shaded markings of underside produce a faint pattern.

Beneath the f.-w. has a brown triangular mark on costa opposite end of cell and the apex is shaded with pale brown. The h.-w. has a spot in cell, sometimes two or three, and there may be a spot in 7 and 1*c*, and another on discocellulars. The discal and marginal areas have pale brown undulating markings of a pattern too inconstant to be usefully described.

The undulating shading of the h.-w. underside suffices to distinguish this species. Western examples generally

have the dusky markings most highly developed, and as we proceed eastwards these are gradually reduced until examples from the Toro Forest have a chalky white ground-colour, a mere suffusion of brownish at f.-w. apex, and only a trace of the h.-w. markings beneath. As an exception there are examples from Sesse I., Uganda, as dark as Western forms.

The claspers show a structure allied to that in *aspidos*, but the upper edge is smoother and the spatulate processes less expanded.

Larinopoda lagyra. Pl. X, figs. 4, 5, 6; Pl. XI, figs. 7, 8, 9.

Hew., Exot. Butt. (*Pentila* and *Liptena*) Pl. 1. f. 4 (1886); Smith and Kirby, Rhop. Exot., 24, p. 93, pl. 21, f. 6 (1893); Auriv., Öfvers, Vet. Akad. Förhandl., 53, p. 435 (1896); Rhop. Aeth., p. 272 (1898); H. H. Druce, Proc. Zool. Soc. Lond., p. 362 (1910); Auriv., in Seitz. Macrolep., p. 329 (1914–18).

= *lara*. Staud., Iris, 4, p. 218 (1891); Smith and Kirby, Rhop. Exot., 21, p. 73, pl. 18, f. 1, 2 (1892).

= *lircaea*. Smith and Kirby, Rhop. Exot., 24, p. 95, pl. 21, f. 11, 12 (1893).

Cameroon. Congo. Toro.

lagyra f. *gyrala*.

Suff. Iris, xvii, p. 49 (1904); Auriv., in Seitz, Macrolep., p. 329, pl. 63 f. (as *gyrula*) (1914–18).

With typical forms.

lagyra f. *emilia*.

Suff. *l. c.* p. 48 (1904); Auriv., *l. c.* p. 329 (1914–18).

With typical forms.

lagyra f. *punctata*.

Druce, Proc. Zool. Soc. Lond., p. 361 (1910); Auriv., *l. c.* (1914–18).

The name *lagyra* is at present applicable to forms of *Larinopoda* described below, but it would appear that there are in fact three species which are not distinguishable on outward characters.

lagyra lagyra.

Exp. 30 to 50 mm. No constant difference in markings of sexes. Ground-colour chalky white. F.-w. with sepia black scaling on

costa from base to about middle, where it may be suddenly narrowed or may run over into apical black. The latter varies from about 10 to 3 mm. wide at apex, and may extend as a marginal border as far as 2 or to hind angle. H.-w. chalky white, spots of underside showing through from beneath.

Underside. F.-w. as above, but apical black paler. Every gradation from this to a mere black marginal line and a blackish spot at apex in 7. A subtriangular costal spot opposite end of cell. H.-w. chalky white with a rounded dark spot in 6, sometimes a smaller one in 5, or in 5 and 7. A small spot in 1c opposite origin of nervule 2. Sometimes a double spot at anal angle.

The *lagyra* forms are distinguished from *eurema* by the absence of a spot in h.-w. cell beneath, and from *aspidos* female by the fact that the latter nearly always has at least a dusting of brownish scales near anal angle of h.-w. beneath. This character is not, however, quite constant and there are females of *aspidos* that cannot with certainty be distinguished from *lagyra*.

Suffert's name *gyrala* is applicable to forms in which the f.-w. costal black is rather broad and runs over into the apical black, whilst there are small spots on h.-w. underside in 5 and 7. The same author's *emilia* is even less distinctive, merely having the f.-w. apical black rather broader than in the type. Druce's *punctata* has a submarginal row of spots on the h.-w. underside.

The forms referable to *lagyra* present considerable difficulties from a taxonomic point of view. If we deal with them on the structure of the male armature, then we must conclude that there are at least three species, one of them very distinct. On Plate XI are drawings of the armatures of these three forms. Fig. 9 represents the claspers of a specimen from the Ja River district in S. Cameroon. The claspers are bifid, thus differing from those of other species of the genus. Fig. 8 is taken from an example from the Upper Kassai district. Here the claspers are still bifid, but the lower fork is much longer than the upper. Fig. 7 is from a specimen taken at Port Victoria, Cameroon, and differs entirely from 9 and 8 and from all other preparations examined. Nearly 60 specimens of the *lagyra* form are before me, and careful comparison shows that whilst they vary in the extent of the f.-w. black, and in the spotting of the h.-w. underside, there are no constant pattern characteristics correlated

to the three forms of genitalia described that would enable us to separate them into three species. There are examples from Gaboon, Ituri Forest, and Toro, but unfortunately most of them are females. One male Toro specimen has claspers like 8, and an example from Buamba Forest, Semliki Valley, is somewhat intermediate between 8 and 9, though closer to 8.

In the genus *Neptis* we have *N. swynnertoni* and *N. neavei* from Mt. Chirinda and Mt. Mlanje respectively, presenting differences in the claspers without constant differences in the external characters, but here there is comparative isolation by separate elevated positions.

Judging from a modelled map of Africa there would seem to be no insuperable physical barrier to account for an asyngamic isolation of the Ja River and Port Victoria specimens, and yet the difference between these two is very marked. In the absence of sufficient material from intermediate localities, if indeed the butterfly occurs in such districts, we can do little more than record the fact that the name *lagyra* at present applies to a series of forms so far outwardly indistinguishable, but including at least three probably asyngamic communities.

With the exception of the forms of *lagyra* the species of *Larinopoda* seem well defined and the armatures distinctive and constant. An incident in the present investigation supports this view. Amongst the material of *lagyra* I found a single example from Sierra Leone. On making a preparation of the armature I was surprised to find that the structure was the same as in *eurema*, the species which is distinguished by having a black spot in the h.-w. cell beneath. There appeared to be no trace of this spot till I made a microscopical examination, when I found, where the spot should be, a few grey-black scales. The specimen is, in fact, an example of *eurema* with the spot almost obsolete.

Explanation of Plate X.

Fig. 1. *Larinopoda lircea lircea* Butl. ♂, N. Cameroon (Coll. Joicey).
2. ,, *lircea* ♀, near *hermansi* Auriv. (intermediate between *hermansi* and *lircea*), Ja River, Bitje, Cameroon (Coll. Joicey).
3. ,, *lircea* f. *spuma* Druce ♂, Ja River (Mus. Tring).
4. ,, *lagyra* Hew. ♀, Upper Kassai River (Oxford).
5. ,, ,, ♀, Ja River (Tring).
6. ,, ,, ♀, ,, ,, ,,

(This example is figured to show that the shape and extent of the f.-w. apical black is not constantly different in Ja River and Kassai River examples.)

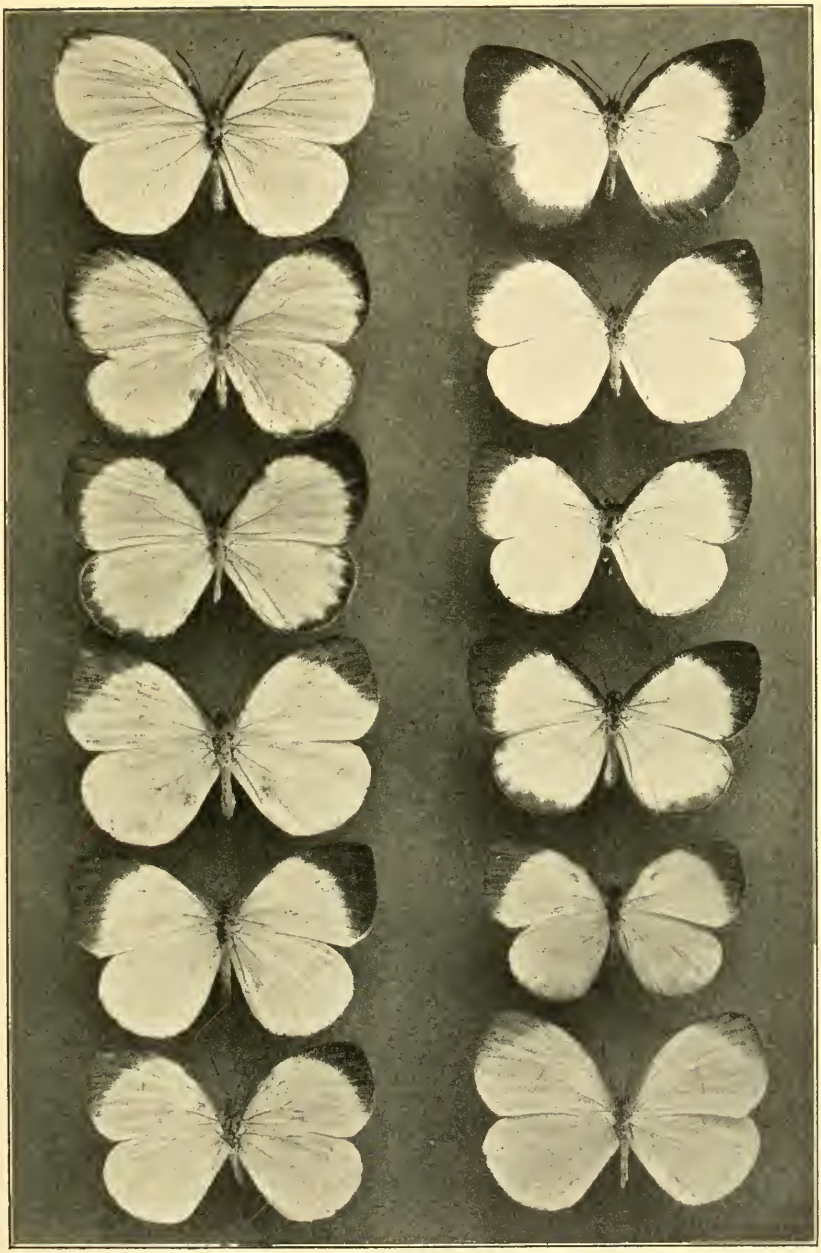
7. *Larinopoda aspidos* Druce ♂, Oni, Nigeria (Oxford).
8. ,, ,, ,, ♀ ,, ,, ,,
9. ,, ,, f. *brenda* Druce ♂, Oni, Nigeria (Oxford).
10. ,, *eurema* Plotz. ♂, S. Leone (Tring).
11. ,, *tera* ♀, Ogowe (London).
12. ,, ,, ♂, Toro Forest (London).

(Examples from the last locality are whiter, generally larger, and have less shading in h.-w. beneath.)

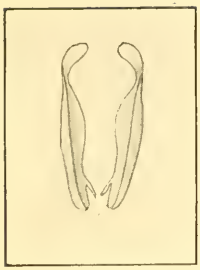
Explanation of Plate XI.

Male Armatures.

Fig. 1. *Larinopoda tera* (claspers).
2. ,, *aspidos* f. *brenda*.
3. ,, *tera* (girdle).
4. ,, *aspidos aspidos*.
5. ,, *eurema*.
6. ,, *lircea lircea*.
7. ,, *lagyra* (Port Victoria).
8. ,, ,, (Upper Kassai River).
9. ,, ,, (Ja River, Cameroon).



FORMS OF LARINOPODA



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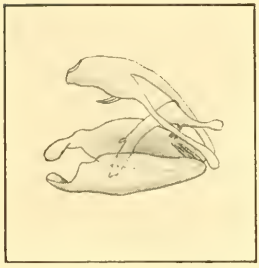

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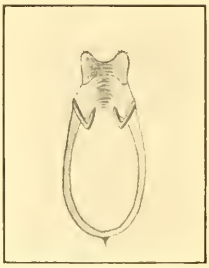

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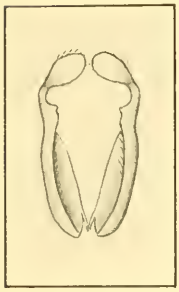

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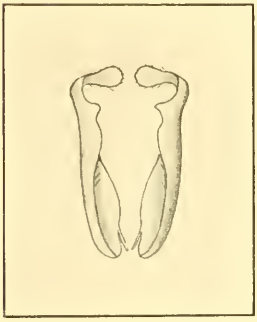

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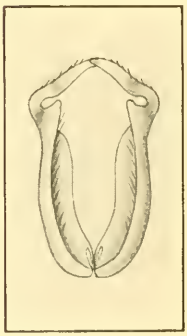

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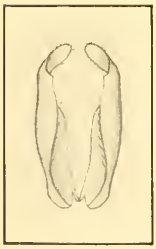

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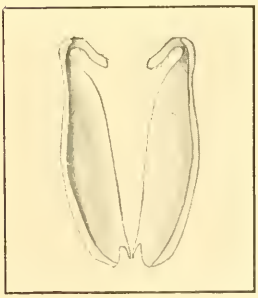

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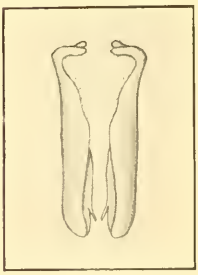

9

H. Eltringham del.

GENITALIA OF LARINOPODA

XII. *A new case of Transformative Deceptive Resemblance in Long-horned Grasshoppers.* By B. P. Uvarov, F.E.S.

[Read June 7th, 1922.]

Serville described (1838, p. 409) under the name of *Leptoderes ornatipennis* a leaf-like long-horned grasshopper from Java, characterised by a very peculiarly elongated pronotum. The same insect—at least, the same genus, if not species—has been redescribed and figured under the same name by Charpentier (1841, pl. 12), as well as by Brunner v. Wattenwyl (1878, p. 143, fig. 35), while Saussure described it again (1898, pp. 228–229, pl. 9, fig. 9) from Borneo and named it *Euparthenes gratiosa*, though a little later (*l. c.*, p. 806) he sank the latter name as a synonym of *Leptoderes ornatipennis* Serv., on Brunner's authority. One more species of the same genus, *L. flavipennis*, has been described by Brunner from Ceylon (1891, p. 70).

The genus *Leptoderes* (or *Leptodera*, as Brunner incorrectly called it, *Leptoderes* being the first name under which it is mentioned by Serville) has been included by Brunner in the special group, Leptoderae, of Phaneropteridae, which comprises, according to him, only one genus more, *Trochalodera* (with a single species, *T. violascens* Br. Watt., in it), the latter having been known to him by a larva only. The description and figure of *Trochalodera*, given by Brunner (1878, p. 143, fig. 36) reminds one strongly of the insect described and figured long before by Westwood (1840, pp. 419–420, pl. 28, figs. 7, 7*a*, 7*b*, 7*c*, 7*d*), under the name of *Condylodera tricondyloides*, from Java, which is also, evidently, a larva, and Dohrn (1892) did not hesitate to synonymise Brunner's species with that of Westwood, while he expressed the opinion that it was a mature insect.

Having recently received two specimens of *Condylodera*, taken one in Java and another in Borneo by Mr. G. E. Bryant who kindly gave them to me to work out, I resolved to try and find out the interrelations of all the above given genera and species. This work has been made possible only by the most obliging assistance of Prof. E. B. Poulton, who at my request brought me from the Oxford Museum the actual type of Westwood's insect together

with two more specimens, and of Prof. R. Ebner who sent me, on behalf of the Wiener Staatsmuseum, the types of the insects described by Brunner, as well as some additional specimens of the same, and my best thanks are due to them both.

The first result I have arrived at, is, that both *Condylodera* and *Trochalodera* are undoubtedly larvae, with the wings and elytra developed and placed quite normally for larvae of corresponding stages of any Tettigoniid, and the statement of Brunner (1878, p. 144), that *Trochalodera* has the elytra not covered by the hind-wings, is due simply to a misplacement of the elytra in his type, while two other specimens, also from Brunner's collection, show a normal position of elytra under the hind-wings.

At the same time, it is evident that the type of *Condylodera* is a larva of an earlier stage than *Trochalodera*, judging by the development of elytra and wings, which gives us an idea in what direction the peculiarly shaped pronotum of *Condylodera* changes during the next larval stages: this direction leads undoubtedly to the more flattened pronotum of *Leptoderes*, while all other characters, and especially the shape of the head and eyes, are in *Trochalodera* and *Leptoderes* quite identical. These considerations enable me to state, without hesitation, that *Leptoderes* is only the imago of the same insect, of which *Condylodera* and *Trochalodera* represent two different larval stages.

The material before me now enables me to describe, briefly, the whole course of transformation which this wonderful insect undergoes during its individual life.

The larva of the first stage is represented by a specimen from Brunner's collection (No. 18,498, "Tengger-Geb., Java"); its pronotum is already unusually elongated, but regularly cylindrical, slightly narrowed anteriorly; the coloration is metallic dark-blue, except the reddish legs with the tibiae brownish and the whole surface of the body, pronotum and head is perfectly smooth. In this stage the insect resembles somewhat a Cicindelid beetle of the genus *Collyris*, as has been pointed out by Shelford (1902, p. 234), but this resemblance is much more pronounced in the larva of the next stage.

The larva of the second stage is in the Oxford Museum (Java), and it is the same specimen which was put by Duponchel in his collection of Cicindelidae under the name

of *Tricondyla rufipes* Dup. (a MS. name). In this stage the pronotum is already feebly twice constricted, which makes it very like a *Collyris*; the coloration is the same as the first stage, and the surface still smooth.

Of the next (?) stage I have before me a larva taken by Mr. Bryant (Depok, Java, 18 iv. 1909; now in the British Museum) together with *Collyris tuberculata* Mcl., and mistaken by him at the time of the capture for that beetle. It has the pronotum with the two constrictions very well pronounced, which gives it a really strong resemblance to *Collyris*, which is still heightened by its pronotum being distinctly punctured in the middle and in the hind portion; on the mesopleurae and the metapleurae are small lobes that represent the developing wings and elytra.

The type of Westwood's *Condylodera* is a larva of the next stage. Its pronotum undergoes further development resulting in so complete a likeness to another Cicindelid beetle, *Tricondyla cyanea* Dej., that Westwood incorporated it in his collection of Cicindelidae (*l. c.*, p. 419). This resemblance is produced by the whole surface of the pronotum being coarsely punctured throughout, while its middle swelling becomes somewhat less globose, and the hind portion slightly flattened. The rudiments of wings and elytra are already well developed and occupy a dorsal position, as may be seen in Westwood's figure, which is fairly accurate, save two lateral spots on the pronotum which cannot be seen in the type.

Three larvae from Brunner's collection (No. 7398, Java, type of *Trochalodera violascens*; Nos. 20,547 and 23,947, Malang, Java) belong unquestionably to the next (fifth ?) stage. In this stage the likeness to *Tricondyla* almost disappears because the pronotum undergoes further changes: its hind portion is decidedly flattened; the two constrictions and the middle swelling included between them are very feebly expressed; there appears at the base of the hind third an obtusangulate transverse sulcus, as well as a faint suggestion of the median longitudinal line; the surface of the pronotum and of the head is strongly and densely punctured; rudiments of wings and elytra are reaching the middle of the abdomen. The coloration is also not quite like that of a *Tricondyla*, being violaceous-brown, and varying towards brown in other larvae; the coloration of the legs remains the same as it was in previous

stages. This stage is figured by both Brunner (1878, fig. 36) and Dohrn (1892, fig. on p. 65), though the latter figure is very unsatisfactory.

It is difficult to say whether the described stage is actually the last larval one, but it is very likely that it is so, judging by the dimensions of the head and the length of the pronotum.

The adult form (Charpentier, 1841, pl. 12; Brunner, 1878, fig. 35; Saussure, 1898, pl. 9, fig. 9) differs from the last described larval stage, apart from the presence of the fully developed wings and elytra which are very broad and leaf-like, by the pronotum being completely flattened on the upperside, without any constrictions or swelling, though still slightly thickened anteriorly and posteriorly, densely punctured throughout, with the angulate transverse sulcus somewhat more distinct; it is quite clear from the comparison of the last larva and adult that they represent the same insect.

This latter conclusion is still more strengthened by the study of a larva of the Ceylon species (Kandy, Ceylon; Brit. Museum) which belongs to the last stage and in which the pronotum has only very faint indication of constrictions and is practically identical in shape with that of the adult, the more so, that in this species the pronotum of the adult is not so strongly flattened as in the Javan one.

This wonderful case of one insect mimicking in different stages of its postembryonic development two other different insects (*Collyris* and *Tricondyla*) and ultimately assuming the shape and coloration of a leaf, might seem unbelievable, if there were not another definitely proved example of the same phenomenon in the case of the African Tettigoniid *Eurycorypha*, which is also leaf-like in the adult stage and an excellent ant-mimic, described under different generic name *Myrmecophana*, in the two first larval stages, while intermediate stages are also of a transitional character (Vosseler, 1908). Vosseler (*l. c.*) proposed for the latter case the term "Transformative Mimicry," and I think that it may be very conveniently adopted also for the case of *Condylodera-Trochalodera-Leptoderes*, which is still more striking than that of *Myrmecophana-Eurycorypha*; it would be, however, more correct to use the term "Deceptive Resemblance" instead of "Mimicry," which does not cover the phenomenon of leaf-resemblance of the adult.

This case gives also an exceptionally strong support to the whole theory of deceptive resemblance based on natural selection. In fact, it is not the likeness itself between *Condylodera* and *Tricondyla* which is most striking, because it might be regarded as accidental, but the fact that a metallic coloration of larvae is unknown amongst Tettigoniidae and is quite exceptional. Moreover, I have before me a larva of evidently another species of *Leptoderes* taken by Mr. G. E. Bryant at Quop, W. Sarawak, Borneo, together with *Tricondyla cyanipes* Esch. subsp. *cavifrons* Sch., which is black, with the prothorax red, and the larva of *Leptoderes* has exactly the same coloration.

Further, the larva of the Ceylon *L. flavipennis* (though in the last stage, which is not a good mimic of *Tricondyla*) differs from the Javan larvae, as has been pointed out above, by the almost not constricted pronotum, and by the brownish-black, slightly metallic shining, coloration, and these characters give it an appearance of the common Ceylon Cicindelid—*Tricondyla granulifera* Motsch., which has the same coloration and the pronotum not swollen in the middle. It is hardly possible, even for an unbeliever in mimicry, to explain these three cases by a mere coincidence!

As regards the classification and synonymy of species of *Leptoderes*, the material at my disposal is too scanty to permit of sufficiently definite conclusions. All I can say is that the Ceylon species, *L. flavipennis* Br. Watt., is distinct from the adult specimens from Borneo and Java, but I hesitate to identify all the latter as the same insect, especially as there are only two females from Borneo and two males from Java, which makes the comparison impossible. The described differences in larvae, however, indicate that there are two distinct species of *Leptoderes* in Java and in Borneo, which does not exclude the possibility that they are not confined each to one island only, as I have before me a larva from Borneo (Kuching, 12 xii. 1899, R. Shelford; Oxford Museum) in which the type of coloration is not the same as in the above described Bornean larva, but the same as in the Javanese one, with the only difference that its entire body is black and only the pronotum shows a faint bluish colour; it may be either a colour variety of the *L. tricondyloides*, or a distinct species, which it seems to me more likely to be.

The purpose of this paper is nothing more than to draw

once more the attention of entomologists collecting in Indo-Malaya, and especially those residing there, to this quite extraordinary case, in the hope that some of them will be able to study the whole problem more closely and to collect more extensive information than that presented above.

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XIII. *A Monograph of the genus* Catochrysops *Boisduval* (*Auctorum*). By G. T. Bethune-Baker, F.L.S., F.Z.S.

Plates XII–XXXII.

[Read May 5th, 1922.]

The genus *Catochrysops* was raised by Boisduval in the "Voyage Astrolabe," p. 87, 1832, and in it he placed three species, *cyta*, *strabo* and *centaurus*—three heterogeneous species, and in more recent years a large number of others, chiefly African, have found a resting-place therein.

In 1875 Scudder, in his "Historical Sketch of the Generic Names of Butterflies," selected for the type of the genus *strabo* (p. 136), but until this time it appears to have been quite overlooked; after this Moore used it in his "Butterflies of Ceylon," and Distant in his "Rhop. Malay." Then came de Nicéville in his work on the Indian *Lycaenidae*, in which he carefully diagnosed it and catalogued the species of his area. After this Aurivillius, in his "Rhopalocera Aethiopica," refers to it as a synonym of his huge genus *Cupido*, and he places all its species and others in his fifteenth section—a very heterogeneous assembly indeed. It has been in general use since that time.

I wish I was able to follow the distinguished Swedish author in his usage of the genus *Cupido*, but, when he says it is the oldest genus, I am quite unable to follow him, and in addition he has apparently overlooked the fact that as long ago as 1870 Kirby had fixed the type of *Cupido* as "*alsus*" (*minima*). It would also appear from his (Aurivillius') remarks on the Lycaenine genera that structural characters do not carry much weight with him, because many of the genera he sinks are based on very definite structural differences.

If I review de Nicéville's use of the genus it will serve, I think, for all the Eastern species, whilst a review of Aurivillius' use will in like manner serve for the African species.

De Nicéville uses the genus for species that possess three quite distinct types of prehensores—viz. *C. strabo* Fab., and *lithargyria* Moore; *C. cnejus* Fab., with its forms *hapalina* Butler, *theseus* Swinhoe, and *pandava* Horsfield; and *C. ella* Butler and *C. contracta* Butler. These may be races of each other, but they belong to a totally different group; they are essentially Lycaenid in their genitalia (by "Lycaenid" I mean they belong to the group of which *Lycaena arion* is the type). I am quite unable to judge why so keen an observer as de Nicéville should consider that they are forms of *C. cnejus*. Lastly, we have *C. pandava* Horsfield and *nicola* Swinhoe—again with widely differing genitalia which are essentially Plebeid in their development. I shall consider these in detail elsewhere, but I think that each of the latter two sections will require a generic name; whilst of *Catochrysops*, as restricted above, I have no doubt that Butler was correct when he gave *cnejus* the new generic name of *Euchrysops*, and this genus of the Asiatic group only can be included in this memoir.

Turning now to Aurivillius we find that in his "Rhopalocera Aethiopica" he groups a vast assemblage of genera and species under the omnibus genus *Cupido*, which he divides off into sections, calling them first group, second group, and so on. I can see a reason for using a single name for a great genus, but if it is necessary to divide it up into sections or groups I can see no reason for discarding the names given to those groups, more particularly when most of those names have been bestowed because of the structural characters obtaining in the species dealt with. The fifteenth group contains all the African species of *Catochrysops* with which Aurivillius was acquainted, but he also includes in the same section twenty-two other species belonging to quite different genera.

I have found one well-marked character in the genitalia that obtains in all the species I have dealt with, but does not obtain in any of the twenty-one species included by Aurivillius in the section, viz. the junction in a most definite way of the furca and the anellus through which the aedoeagus invariably passes and in which it rests; whilst in addition to this character the whole form and structure of the genitalia differ considerably from them.

The following is a list of the species which I exclude.

Cupido eleusis Demaison.	*Cupido cissus* Godart.
,, *contractus* Butler.	,, *iobates* Hopffer.
,, *lois* Butler.	,, *micyclus* Cramer.
,, *sancti Thomae* E. M. Sharpe.	,, *togara* Plötz.
	,, *stellata* Trimen.
,, *scintilla* Mabille.	,, *anatossa* Mabille.
,, *sanguigutta* Mabille.	,, *gaika* Trimen.
,, *messapus* Godart.	,, *lysimon* Hübner.
,, *mahallakoena* Wallengren.	,, *mylica* Guenée.
	,, *lucida* Trimen.
,, *hippocrates* Fabricius.	,, *atrigemmata* Butler.
,, *trochilus* Freyer.	,, *unigemmata* Butler.

I have bracketed those that are closely allied. The first four, *eleusis*, *contractus*, *lois*, and *sancti Thomae*, belong to an Oriental group of species that have hitherto been placed in *Catochrysops* by most recent authors; but the type of *Catochrysops* being *strabo*, it is not possible to retain them in that genus, because they have genitalia closely allied to the genus *Lycaena*, and are therefore *Plebeinae*, whilst *Catochrysops* belongs to the *Lampidinae*.

Scintilla should also be included among the *Lampidinae*, and *sanguigutta ;* but whilst the pattern of the latter is closely allied to *scintilla*, the genitalia are quite different and are similar to the next group, and thus it links up the two sections.

The third group, *messapus*, *mahallakoena* and *hippocrates*, form a group of their own with several more recently described species, and have the furca quite free, that is, a simple bifurcate organ arising from the harpagines near the base, but with the tegumen very specialised, and I think they should be included in the *Lampidinae*. *Trochilus* is a *Chilades* somewhat allied to the Palaearctic *galba* and *phiala* and the Indian *laius*.

Cissus and *iobates* should, I think, be also placed in the *Lampidinae*, though the genitalia are somewhat specialised.

Micyclus and *togara* are allied to the large world-wide *Lycaenopsis* section, but it is well to state that they are two separate species. Aurivillius considers them ("Rhop. Aethiop.," p. 377) as the same, but I came to the conclusion after examining a number of each that they must be distinct, and I therefore dissected out the genitalia and found they were quite different (see Plate XXV, figs. 64 and 65).

Anatossa, *gaika*, *lysimon*, *mylica*, *lucida*, *atrigemmata* and *unigemmata* all belong to the *Zizeeria* group, and have been most ably and effectively dealt with in the Transactions of the Entomological Society of London, 1910, p. 479, by my esteemed and much-missed friend, the late Dr. Chapman.

I figure (Plate XXV, fig. 63) the genitalia of *Catochrysops strabo* to enable my readers to see the very marked difference in the whole formation of these organs, and I would draw attention to the simple furca of this genus compared with the much more extensive organ obtaining in *Neochrysops* and its allies. *Lycaenopsis* (?) *micyclus* and *togara* I also figure, to show that these are quite evidently distinct species (Plate XXV, figs. 64 and 65).

As is usual with this family, we have some range of colour differences, blues of various shades toning down almost into white. Browns in both sexes are not uncommon; whilst there is one species, *cupreus* Neave, which is a very beautiful and unusual coppery brown with a fine blue female. Sexual dimorphism is very rare in the group; in *malathana*, in *cupreus*, in *victoriae* we find brown or brownish males with blue females, the same also occurs in *neavei*, but these with one or two more are quite exceptional, the general characteristic being that both sexes are more or less the same colour, though the area of blue is less in the female than it is in the male; and we have no case at all in which the males are blue and the females brown, a dimorphism that is very common in the palaearctic region and elsewhere. There are, however, several species in which both sexes are brown.

The androconia or battledore scales are interesting; for species ranging so large in size as these do they are very small indeed, there being only one species with these scales of any considerable dimension; they are of great assistance in separating closely allied species. I showed some years ago (Trans. Ent. Soc. Lond., 1913, p. clix) that androconia were not confined to species with blue coloration, but that they also obtained in some quite brown ones; this is confirmed by this genus, for all the brown males with two or three exceptions have well-marked androconia (battledore scales), whilst there is one blue one that has none of them. These scales, however, sometimes differ in development, and I have figured several abnormal examples to show this process (Plate XXXII).

The eyes of the majority of the group are hairy, but there is a small number that have glabrous eyes, several of these, however, have the clasps of quite a different shape, and they will probably form new genera; the furca and anellus are, however, of the specialised structure already referred to, thus showing that they belong to this group *in sensu stricto*.

The distribution of the group is very limited; the great majority are confined to the Aethiopian region, and many appear to have a very restricted range therein. None whatever obtain in both the Oriental and Aethiopian regions, though if the pattern alone were considered there would be little doubt that *E. cnejus* and *E. osiris* would be placed as Indian and African forms of the same species; the genitalia are, however, very different, the androconia likewise differ, thus proving the distinctness of the two. There are two species common to Africa and Madagascar, and there is one species peculiar to Madagascar, whilst there are sixty species peculiar to the African continent itself. In the Oriental Region I only recognise two or three species, viz. *cnejus* with probably the Bali Island race *suffusus* Rothschild; whilst *luzonicus* Röber may possibly be another species, though from the genitalia (see Plate XXIII, fig. 50*a*) I rather doubt even this.

Scudder fixed the type of the genus *Catochrysops* as *strabo*, an oriental species and quite different generically to all the other species hitherto included in Boisduval's genus; it becomes necessary therefore to erect a new one to contain the large assemblage of African species, and I propose the name *Neochrysops* for this purpose.

Neochrysops gen. nov.

Head smallish, eyes small, hairy; frons rather broad, central area filled with loose scales and hairs, margins having closely appressed scales; antenna with long tapering clubs to beyond the centre of the costa. Palpi of moderate length, basal segment short, second segment long, end segment shortish; the two former covered with closely appressed scales giving a very smooth appearance. Legs, mid and hind pair, with a pair of short spines on tibiae at tarsal joint.

Wings. Primaries moderately broad, not long, with straightish costa, hind margin arched; secondaries, not very ample, evenly curved from the apex. Neuration. Primaries: vein 2 emitted

at two-thirds from the base, 3 from before the angle, 5 from about the centre of the discocellulars, which are rather prominently V-shaped only in a horizontal position, 7 from behind the upper angle, 8 from 7 from rather beyond its centre, 9 absent, 10 from midway between 11 and the upper angle, 11 from about the middle of the cell, 12 not reaching to the end of the cell and fairly straight. Secondaries: vein 2 from beyond the middle of the cell, 3 from before the lower angle, 5 from about the middle of the V-shaped discocellulars, 7 from the cell before the upper angle, 8 highly arched towards the costa.

Type *Neochrysops parsimon* Fabricius.

Fabricius's insect is the earliest described species of the group, and it is essentially typical of the majority of the African species; I have therefore selected it as the type in honour of this laborious and voluminous Danish naturalist.

Neochrysops niobe Trimen. Plates XII, fig. 1; XV, fig. 2, and XXVI, fig. 2.

Lycaena niobe Trimen, Trans. Ent. Soc. Lond., p. 282 (1862); *id. idem* Rhop. Afr. Austr., p. 253 (*in parte*), Pl. 4, fig. 10 (1866); *id. idem* S. Afr. Butt., ii, p. 36 (*in parte*) (1887).

Cupido niobe Aurivillius, p. 378 (*in parte*) (1898).

Catochrysops niobe Butler? ?, P.Z.S. Lond., p. 186 (1898).

♂. Upperside, both wings dull cupreous violet with no markings, no bar at end of cells, with broad brown termen. Underside, both wings, dark brownish grey with black spots with pale edging, a pale greyish white postmedian stripe beyond the postmedian series of spots. Primaries with a spot closing the cell, the postmedian series composed of six spots, the upper three forming a marked short curve outwards, whilst the lower three are inverted and are curved inwards, the third spot is slightly oval and oblique, and the sixth spot below vein 2 is double; there is a very bare trace of a submarginal and marginal series of slightly darker dashes. Secondaries with all the spots reduced to points or dots, the four near the base just traceable in the position usual to the genus, the postmedian series interrupted below the fourth spot, the last spot (very small) on the inner margin distinct, practically no trace of the marginal and submarginal dashes, a subanal small marginal spot sometimes present.

♀. Upperside, both wings, brown with the basal and median areas violet. Underside as in the male.

Expanse, ♂ 34–38; ♀ 39–42 mm.

Hab. Knysna, Cape Colony.

Types in the Joicey collection.

An exceedingly rare and local species at present only recorded from Knysna.

Genitalia very broad and of moderate length, somewhat curved above and below, at a third from the apex it is reduced and the tip is folded over into a very broad rounded dentate lobe, knobbed on its upper margin; the teeth are strong, but are smaller and more numerous than in *lacrimosa*; furea broadish, highly curved, with the anellus but slightly developed; aedoeagus longish tapering gradually towards the tip; apex hooked with two large strong teeth at a fifth from the end; cingulum broad, somewhat angled; tegumen, a very narrow elevated ridge at the extreme rear, with the cheeks produced well forwards, somewhat lobe-shaped, with numerous longish, straight bristles; falces broad and strong, of but moderate length.

Androconia slightly variable in size, pyriform, asymmetrical, subconical distally; footstalk broad and long, asymmetrical proximally, usually with fourteen rows of reticulations very closely appressed and irregular, being slightly twisted, and so close vertically as to almost appear to be ribbed; in the larger sized androconia there are two or three more reticulated rows.

Neochrysops lacrimosa, sp. n. Plates XII, fig. 2; XV. fig. 3, and XXVI, fig. 3.

Lycaena niobe Trimen (*in parte*), Rhop. Afr. Austr., p. 253, Pl. 4, fig. 10 (1866); *id. idem* S. Afr. Butt., ii, p. 36 (*in parte*) (1887).

Catochrysops niobe Butler, P.Z.S. Lond., p. 186 (1898).

Cupido niobe Aurivillius, p. 378 (*in parte*) (1898).

♂. Upperside, both wings dull violet colour, rather pale and slightly iridescent, with narrow brown termen and without spots at the end of the cells. Underside, both wings pale grey, with black spots edged with white. Primaries with a sublunular dash closing the cell; the postmedian curved series composed of six spots, the third placed obliquely, the sixth minute; an indefinite row of submarginal, internervular lunules preceded by a broadish, whitish area, and a trace of a terminal row of similar half-moons. Secondaries, all the spots very small, four minute dots near the base, three below each other and one on the inner margin close to the base, a fine dash closes the cell; the postmedian series consists of eight spots, the first below vein 8, the second to the sixth arranged in a

deep curve, almost a small semicircle, the seventh is shifted far outwards and the eighth inwards; a broad whitish area follows, and is edged externally by an indefinite row of internervular lunules, which is succeeded by a terminal row of semicircular, barely traceable marks, a trace of a subanal black spot.

♀. Upperside, both wings brown with the basal and the median areas lustrous blue, with a trace of a spot closing the cells. Underside as in the male.

Expanse, ♂ 33–38; ♀ 35–40 mm.

Hab. Newcastle, Natal (Kaffirland, Zululand; Transvaal?).

Types in my collection.

This species has hitherto been confused with *N. niobe* Trimen, that author himself having considered it as merely an aberration of his insect. The androconia are, however, very different and quite prove its distinctness.

Neochrysops lacrimosa major var. nov.

♂. Upperside, both wings solid violet blue, a full-toned colour, without the iridescent hue noticeable in the smaller race. Underside, both wings similar to the parent form, but with the underside paler and all the markings well accentuated. A very much larger race than the other.

Expanse, ♂ 44 mm.

Hab. Newcastle, Natal.

Type in my collection.

Trimen refers to the variableness of the species, but does not mention the difference in size, which with the marked diversity in colour makes the local form quite worthy of a name; the genitalia are quite typical.

Genitalia. Harpagines very broad indeed and moderately long, upper margin highly arched from the base to beyond the middle, where it is somewhat excised to the apex, which ascends slightly into a knobbed extremity; lower margin waved, with the terminal half expanded into a large rounded dentate lobe whose saw-edged teeth are large and strong; furca unusually well developed, with the anellus having a well-curved front margin; aedoeagus of moderate dimensions with two strong teeth near the extremity, on the upper edge, the apex itself being expanded into a large trumpet-mouthed orifice; cingulum broadish, angled forward above the middle; tegumen a narrow, substantial ridge with rounded

cheeks and strong broad falces shorter than usual. Harpagines and cheeks well supplied with longish bristles.

Androconia conical, but with the distal half tapering rapidly to an acute apex, stalk long and broadish, twelve rows of reticulations placed rather close together both laterally and vertically.

Neochrysops ariadne Butler. Plates XV, fig. 4; XXVI, fig. 4.

Catochrysops ariadne Butler, P.Z.S. Lond., p. 193, Pl. XX, figs. 3, 4 (1898).
Cupido ariadne Aurivillius, Rhop. Aethiop., p. 378 (1898).

♂. Upperside, both wings violet blue, rather brighter than in *N. lacrimosa*, with broadish brown termen—no mark at the end of the cells. Underside, both wings brownish grey, very similar in colour to *N. niobe*, with black spots encircled with white. Primaries with a spot closing the cell, postmedian series composed of five subpyriform spots, well arched and inclined inwards towards the fold, a trace of a very small spot below the fifth, a series of six white internervular spots, a row of marginal spots of ground-colour edged internally with whitish lunules. Secondaries almost precisely as in *N. niobe* but all the pattern emphasised, with a black subanal spot with blue metallic scales.

♀. Upperside, both wings brown with a very restricted dull violet basal area. Secondaries with an indistinct postmedian row of pale violet spots. Otherwise as in the male.

Expanse, ♂ and ♀ 42 mm.

Hab. NATAL.
Types in the British Museum.

Genitalia. Harpagines rather narrower than in *niobe* or *lacrimosa*, with the dentate flap having many more teeth of a decidedly smaller size; the anellus and aedoeagus are very similar to *lacrimosa;* the tegumen is decidedly larger, with more ample cheeks, which are angulated, not rounded; the falces large and broad, with the hooked extremity much more pronounced.

Androconia, conical, acute and asymmetrical distally, with a longish taper proximally into the attachment stalk; eleven rows of reticulations irregular as in *N. niobe*, but placed further apart as in *N. lacrimosa.*

Neochrysops tantalus Trimen. Plates XV, figs. 5, 5*a*; XXVI, fig. 5.

Lycaena tantalus Trimen, S. Afr. Butt., ii, p. 38 (1887).

Cupido tantalus Aurivillius, Rhop. Aethiop., p. 376 (1898).
Lycaena tantalus Trimen, Trans. Ent. Soc. Lond., 1906, p. 74, Pl. V, figs. 10, 10*a* (1906).

♂. Upperside, both wings dull soft violet with narrow brown termen, and a brown dash closing the cell in the primaries only. Underside, both wings pale whitish grey with darker spots and markings edged with white. Primaries with a blackish dash closing the cell followed by the postmedian series of six smallish, blackish spots which are not curved, the third spot is placed obliquely, the fifth shifted far inwards, the sixth almost double spot lying below it, a row of six subsagittate internervular brown dashes, a faint row of terminal semicircular spots. Secondaries with the usual basal spots obsolescent and very small, a fine lunular pale brown dash closing the cell, above which is a blackish spot below vein 8, the postmedian series of seven pale brownish irregular, the second spot shifted outwards and forming a curve with spots three, four, and five, the sixth shifted outwards, and the seventh inwards; area up to the submarginal lunular series whitish, a terminal row of very pale indefinite brownish spots, occasionally there is a very small black anal and subanal spot, but they may be absent.

♀. Upperside, both wings brown with the basal two-thirds up to vein 5 brightish sublustrous blue. Otherwise like the male, only the underside pattern may be somewhat accentuated.

Expanse, ♂ 42–44; ♀ 41 mm.

Hab. Kaffraria; Natal.
Type in the Joicey collection.

Genitalia of the type general to the genus, not like the preceding species, which are unique in this group. Harpagines like two long narrow arms, somewhat wider at the base, highly curved, tapering off near the extremity into a slightly hooked apex; the arms are unusually long and strong considering the size of the species, and are somewhat sparingly furnished with strongish bristles. Anellus ample front edge gently curved; aedoeagus broadish, of but moderate length; cingulum of only moderate length; tegumen very narrow with cheeks of smallish dimensions, curved slightly forwards into a lobed extremity with long falces that have broad shoulder pieces; cheeks with longish bristles.

Androconia, tulip-shaped, broad, well arched distally with twelve or thirteen rows of reticulations, the reticulations being placed well apart vertically.

Neochrysops ignota Trimen. Plates XVI, fig. 6; XXVI, fig. 6.

Lycaena ignota Trimen, S. Afr. Butt., ii, p. 39 (1887).
Cupido ignotus Aurivillius, Rhop. Aethiop., p. 376 (1898).
Catochrysops ignota Butler, P.Z.S. Lond., p. 193 (1898).
Lycaena ignota Trimen. Trans. Ent. Soc. Lond., 1906, p. 75, Pl. V, fig. 11.

♂ and ♀. Uppers de, both wings pale brownish, with a darker line closing the cells and a fine dark termen with greyish fringes. Underside, both wings hoary grey with darker spots, often inclined to blackish, encircled with whitish. Primaries with a spot closing the cell, the postmedian series consisting of six spots, the second and third often placed obliquely to each other, curved outwards from the first spot, and in a slight curve with the fourth and fifth, the last of which is shifted somewhat inwards and the sixth slightly outwards; an indistinct row of submarginal internervular lunules. Secondaries with four small black spots near the base, three below each other, and one smaller close to the base on the inner margin, another black spot above the lunule closing the cell, the postmedian series composed of six spots, the upper five in a fairly deep curve, the sixth shifted slightly outwards, a submarginal row of deepish internervular lunules.

Expanse, 36–40 mm.

Hab. Natal; Transvaal.
Types in the Joicey collection.

Genitalia. Harpagines of the usual narrowish arm-like process, somewhat wider at the base, slightly concave on its lower margin, almost straight along the upper margin which is suddenly excised near the tip and bent downwards to form a strong smallish sickle-like apex, which is sharply dentate, the whole length is furnished with rather fine bristles; the anellus is small, subconical at its front margin but with an irregular outline; aedoeagus of moderate length and width; cingulum shorter and less narrow than usual; tegumen a very narrow raised ridge at the extreme rear; cheeks projected well forward bluntly wedge-shaped; falces deeply curved toward the base, where they are broad, but the apical two-thirds are very narrow. Cheeks with fine bristles.

Androconia, rather large, oblong, with the corners well-rounded off, ten rows of reticulations placed rather far apart, sculpturing large and definite.

Neochrysops pephredo Trimen. Plates XVI, fig. 7; XXVI, fig. 7.

Lycaena pephredo Trimen, S. Afr. Butt., iii, p. 389 (1899).
Cupido pephredo Aurivillius, Rhop. Aethiop., p. 378 (1898).
Lycaena pephredo Trimen, Trans. Ent. Soc. Lond., 1906, p. 75, Pl. V, fig. 12 (1906).

♂. Upperside, both wings brown of a warm tone with a slight bronzy tinge, termen finely dark brown, fringes whitish. Underside, both wings pale hoary brownish grey, with slightly darker markings edged with white. Primaries with a spot closing the cell, followed by the postmedian series composed of five or six spots, the second spot shifted outwards, the third and fourth in line with it, fifth shifted inwards, sixth rarely present—in the type male the three upper spots only are present, the submarginal row of internervular dashes indefinite. Secondaries, with the usual black basal spots obsolete in the type male, but generally present though very small, a fifth quite small black spot placed above the spot closing the cell; the postmedian series composed of six spots scarcely darker than the ground colour, the second shifted far outwards and in a line with the third, fourth and fifth, placed very obliquely inwards, sixth spot shifted outwards, a broad white band which is edged with a sharply crenulate, very irregular darkish brown margin, beyond which in a hoary marginal area is a series of terminal indefinite pale brownish spots. No tails.

Expanse, ♂ 40–42; ♀ 40 mm.

Hab. Natal.
Types in the Joicey collection.

Genitalia. Harpagines of but moderate length, somewhat wider at the base, narrowish, concave at its lower margin, straight on the upper margin, gradually excised at a third from the apex into a broad serrated billhook termination; anellus large, excavated above in front, slightly curved laterally; aedoeagus short and very broad; cingulum of moderate length and narrow dimensions; tegumen, a very narrow raised ridge at the rear; cheeks projecting forwards, unequally wedge-shaped; falces very broad, deeply curved, of moderate length. Harpagines sparsely furnished with strong bristles, cheeks of tegumen with fine bristles.

Androconia decidedly large, roughly oblong, with rather squarish corners distally, but tapering off to the footstalk proximally, eleven to twelve rows of reticulations placed well apart, sculpturing inclined to be obsolescent.

Neochrysops methymna Trimen. Plates XII, fig. 3; XVI, fig. 8; XXVI, fig. 8; XXXII, fig. 64.

Lycaena methymna Trimen, Trans. Ent. Soc. Lond., p. 280 (1862); *id. idem* S. Afr. Butt., ii, p. 27 (1887).
? *L. celaeus* Trimen, Rhop. Afr. Austr., p. 248 (1866).
Lycaena methymna Holland, P. U.S. Nat. Mus., xviii, p. 238 (1895).
Cupido methymna Aurivillius, Rhop. Aethiop., p. 373 (1898).

♂ and ♀. Upperside, both wings uniform palish brown with tessellated white and brown fringes. In fresh specimens from Cape Colony, the tone is often warm reddish brown or bronzy brown, Natal specimens being altogether colder in colour. Underside, both wings greyish brown with slightly darker markings edged with white. Primaries with a fair-sized spot closing the cell; postmedian series near this spot composed of three or four increasing upper spots, the fourth, long, running into the cell spot, and followed by three lower spots, the first smallish immediately below the fourth, the second and third of the lower series shifted right inward below the cell spot; a more or less confluent submarginal series of dashes; the white edges are generally broad. Secondaries with the basal black spots very small and obsolescent, the one below the costa far out and larger; in the ♀ these are all sometimes prominent, the spot closing the cell is quite confluent with the postmedian series, which is composed of six confluent spots or dashes, the first one a slightly wedge-shaped dash, the second and third very long dashes, fourth very small, fifth shifted inwards, small, sixth a longish broad dash; this series is edged externally by a broad, very irregular white area, a submarginal series of darkish brown subsagittate marks followed by a row of slightly paler terminal spots, a trace of a subanal black spot.

Expanse, ♂ 33–38; ♀ 42–44 mm.

Hab. Cape Colony; Kaffirland; Natal; East Africa.

Types in the Joicey collection.

Genitalia of very slight dimensions. Harpagines very narrow, wider at the base, concave at the lower margin, convex on the upper margin, terminating in a hooked apex which is bluntly dentate; they are furnished with long, strong bristles; anellus with the front edge well curved; aedoeagus largish, slightly waived; cingulum very slight, longish, angled forwards; tegumen a narrow ridge, at the extreme rear; cheeks not large, curved forwards with

long bristles; falces rather large in comparison with the other parts.

Androconia, a long oval of regular outline, with eight rows, occasionally nine, of reticulations placed well apart; the sculpturing itself being also well separated vertically.

Neochrysops puncticilia Trimen. Plate XVI, fig. 9.

Lycaena puncticilia Trimen, Trans. Ent. Soc. Lond., p. 350 (1883); *id. idem* S. Afr. Butt., ii, p. 29, Pl. 8, fig. 4 (1887).

Cupido puncticilia Aurivillius, Rhop. Aethiop., p. 373 (1898).

♂ and ♀. Upperside, both wings uniform rufous brown, markless, with brown fringes narrowly tessellated with white. Underside, both wings uniformly brown with darker spots finely edged with white. Primaries with the usual spot closing the cell; the postmedian series composed of six spots of nearly equal width, which are longer than the breadth; the series is unbroken and is slightly waived; the sixth spot is a twin one, a row of terminal short narrow dashes broadly (comparatively) encircled with white and edged internally by a series of subsagittate brown marks with a fine paler internal margin. Secondaries, with the basal spots, usually black, dark brown, the postmedian series very irregular and confluent with the spot closing the cell, first spot oval, second and third very long and confluent with the two spots in the cell, fourth spot minute, fifth spot very small, shifted inwards, sixth spot very long, seventh much smaller; the terminal row precisely as in the primaries.

Expanse, ♂ 29–33; ♀ 35 mm.

Hab. Cape Colony.

Types in the Joicey collection.

Genitalia. Harpagines shortish, moderately broad at the base, tapering rapidly to the centre, where they are narrow, slightly widening to a quarter from the apex, where they are swollen and suddenly excised into a hooked apex, sparsely furnished with fine bristles; anellus with the front edge subconical and waived; aedoeagus of moderately large dimensions; cingulum fairly wide, shortish; tegumen, an exceedingly narrow ridge at the rear (the narrowest in the genus), with the cheeks extended forwards and downwards into good-sized lobes with fine long bristles; falces moderately large.

Androconia: in the single male specimen I have examined I cannot find any of these scales.

Neochrysops leucon Mabille. Plates XV, figs. 1, 1*a*; XXVI, fig. 1.

Lycaena leucon Mabille, Pet. Nouv. Ent., 2, p. 289 (1879, January); *id. idem* Hist. Mad. Lep., i, p. 226, Pl. 29, figs. 5 to 6*a* (1885–7).

Castalius azureus Butler, Ann. and Mag. N.H., iv, p. 230 (1879, September).

Cupido leucon Aurivillius, Rhop. Aethiop., p. 377 (1898).

♂. Upperside, both wings brilliant metallic pale silvery blue, with narrow, black margins. Primaries with a black spot closing the cell and a broadish black apex. Secondaries with a smallish black subanal spot and a fairly stout tail. Underside, both wings pure white with large deep black spots. Primaries with a spot closing the cell; the postmedian series consisting of three very oblique spots with a fourth below them, vertically below which shifted well inwards is a fifth, rather longer spot, a series of six narrow subterminal dashes and a series of six half-round smallish terminal spots. Secondaries, with three large subbasal spots below each other, an inner marginal narrow one nearer the base, a rectangular one closing the cell; postmedian series irregular; cell spots large, two below the costa, the second shifted outwards, the third and fourth shifted far out, the fourth being wedge-shaped, fifth spot shifted well inwards, sixth long inwards again, seventh well outwards; subterminal and terminal series as in the primaries, with the addition of a subanal and anal spot with metallic scales and a little yellow above the subanal spot.

♀. Upperside. Primaries brown, the basal three-quarters to the upper margin of the cell white. Secondaries white, costa to vein 8 brownish, a subterminal row of internervular brown dashes followed by a terminal row of blackish spots, a subanal spot with yellow internal edging. Underside like the male except that in the primaries there is no postmedian series of spots, and the spots are not elongated in the secondaries.

Expanse, ♂ 20; ♀ 22–23 mm.

Hab. Madagascar.

Types in Mabille's collection; Butler's type *azureus* in the Brit. Mus.

Genitalia with the harpagines of the longish arm-like shape wide at the base and tapering rapidly narrow, but widening slightly again beyond the middle, at a quarter from the apex narrowing and excised into a sickle-like tip; the sickle being armed with dentations on the exterior; the bristles are long and strong; the aedoeagus is

of moderate length and width; cingulum less long than usual and narrow; tegumen a narrow ridge with projecting lobe-shaped cheeks well supplied with longish bristles; falces rather stout, but less long than usual.

Androconia large, of a longish oblong shape, slightly arched distally, tapering rapidly off into the longish attachment stalk proximally, ten, or more often eleven, rows of reticulations placed fairly closely together, whose sculpturing is moderately widely apart vertically.

The androconia are not plentiful.

Neochrysops pampolis H. H. Druce. Plates XVI, fig. 10; XXVI, fig. 10.

Catochrysops pampolis H. H. Druce, Trans. Ent. Soc. Lond., p. 258. Pl. 13, fig. 11 (1905); *id.* Neave, P.Z.S. Lond., p. 58 (1910).

♂. Upperside, both wings dull, rather transparent violaceous, with the veins showing up as fine dark lines. Primaries with a blackish dash closing the cell; termen finely dark. Secondaries with a subanal black marginal spot. Underside, both wings whitish with brown marks and spots. Primaries with a large spot closing the cell, followed by the postmedian series almost angled at the second spot, composed of five spots, the second squarish and shifted outwards, the third similar, shifted inwards, fourth well inwards, isolated, third inwards again and isolated, small; a series of six subreniform submarginal spots and a row of rather fine, more or less confluent marginal internervular dashes ending at vein 2. Secondaries with four dark spots near the base, not black, three below each other and one very small nearer the base on the inner margin, a fifth shifted right out over the postmedian series on vein 8. Postmedian series very irregular and confluent with the spot closing the cell, the second and third spots rather confluent, the second shifted further out than the third, fourth very small, shifted well inwards, fifth inwards again and smallish, sixth long, extending beyond the fifth on both sides; a submarginal crenulated series of lunules; a marginal narrow brown border; a subanal black spot with blue metallic scales, and a broad chrome-yellow lunular edging, with a trace of a similar small anal one.

♀. Upperside, both wings sooty brown with large violet blue areas and whitish postmedian series of internervular spots; cells with large spots at or near discocellulars. Secondaries with a row of marginal spots with white internal edging. Otherwise as in the male.

Expanse, ♂ 40–42; ♀ 42 mm.

Hab. N.W. Rhodesia and Northern Rhodesia.
Type in the Joicey collection.

Genitalia rather small, harpagines oval at the base, tapering rapidly into a narrow, arm-like process, not very long comparatively, highly concave at the lower margin and convex at the upper margin, tapering beyond the centre into a long hooked apex; they are moderately furnished with long bristles; anellus with front edge slightly waived, nearly erect; aedoeagus broad, of moderate length; cingulum of moderate width and dimensions; tegumen, a narrow raised ridge at the rear, with oblong cheeks projected far forward horizontally with longish bristles; falces long narrowish.

Androconia, large oval with a small central depression in the distal edge, and with ten or eleven rows of reticulations placed fairly well apart; the sculpturing being also well apart vertically.

Whether this species is distinct from *reichenowii* Dewitz I am unable to say, not having had the opportunity of seeing the type of the latter.

The figure shows only a narrow submarginal stripe to both wings, whereas Druce's insect has a broad submarginal and a narrow marginal stripe; it might well be the wet-season form, and *reichenowii* (from Angola) a dry-season form of the same species.

There remains, however, the possibility of the artist's delineation being in error, for it would be very easy to combine the two stripes into one, and the figure has an unnatural appearance to my eyes.

The synonymy had better, however, remain as it is at present, leaving the two species distinct for the time being.

Neochrysops reichenowii Dewitz.

Plebeius reichenowii Dewitz, Nov. Act. Cur., 41, 2, p. 203, Pl. 26, fig. 14 (1879).
Cupido rechenowii Aurivillius, Rhop. Aethiop., p. 372 (1898).

"Alae supra cano-violaceae maculis, vittisque paginae inferioris translucentibus parum; alae posticae ad caudam macula fulva nigropupillata. Alae subtus albidae maculis faseiisque maculatis fuseis et nigris; alae posticae ocellis duobus fulvis nigro pupillatis. Longitudo alae anticae, 0·017 m.

"Oberseite graublau. Flecken und Binden der Unterseite auf der Oberen wenig sichtbar. Am dem Schwänzchen der Hinterflügel ein ziegelrother, sehwarz gekernte Fleck, ein zweiter dicht daneben

am Analwinkel nur angedeutet. Saum und Vorderrand der Flügel schwärzlich Schwänzchen schwarz, mit einigen weissen Haaren. Fransen schwärzlich, mit weissen Haaren durchmischt.

"Unterseite weisslich. An der Schlussader der Discoidalzelle der Vorderflügelein schwarzbrauner Fleck; zwischen ihm und dem Saume verläuft eine aus viereckigen dunkelbraunen Flecken zusammengesetzte Querbinde, dicht neben dem Saume eine zweite bräunliche, gefleckte, unbestimmte, schmale Querbinde.—Die Hinterflügel tragen auf der Wurzelhälfte einige schwarze, zum Theil abgerundte Flecken, in der Mitte des Discus eine breite, winkelige und am Saume eine schmälere, braunliche Querbinde. Der ziegelrothe, schwarz gekernte Augenfleck am Schwänzchen zeigt sich unterseits noch etwas intensiver; ebensotritt der zweite am analwinkel gelegene, oberseitz nur angedentete ziegelrothe Fleck unterseits deutlicher nervor und zeigt au seinem dem Flügelrande zugekehrnte Theile eine schwärzliche Schattirung, bildet also unterseits bereits den Anfang zu einem Augenfleck. Adern der Flügel und Saumlinie unterseits bräunlich. Fransen wie oben.

"Kopf und Körper schwarz; Unterseite des letzteren, Beine und Palpen weiss behaart. Fühler Schwarz, au den Gelenken weiss geringelt.

"Nach einem Stück (♂)." [*l.c.*]

I have been unable to see this unique type, and have therefore given the original description in full, and also a reproduction of Dewitz's figure. Druce's *pampolis* is evidently an exceedingly close ally; above the colour is the same, whilst on the underside the latter has in addition the usual subterminal series of dashes which is only represented in *reichenowii* by the two marks at the anal angle of the primaries. In the secondaries, *pampolis* has the usual terminal row of spots, which is quite lacking in the original figure. Whether this is a vagary of the artist I am quite unable to say, but under any circumstances *pampolis* must, I think, be considered only a local race of Dewitz's species.

Neochrysops asteris Godart. Plates XII, fig. 6; XVI, fig. 12; XXVII, fig. 12.

Polyommate asteris Godart, Enc. Meth. H. N. Ent., 9, p. 657 (1824).
Lycaena celaeus Trimen, Rhop. Afr. Austr., p. 247 (1866).
Lycaena caffrariae Trimen, S. Afr., Butt., ii, p. 23 (1887).
Cupido caffrariae Aurivillius, Rhop. Aethiop., p. 372 (1898).
Catochrysops caffrariae Butler, P.Z.S., Lond., p. 843 (1898).

♂. Upperside, both wings brilliant pale violaceous lustrous blue with fine dark termen. Primaries with a linear dash closing the cell. Secondaries with a subanal black marginal spot with a trace of orange internal edging; fine blackish tails. Underside, both wings pale brownish grey with prominent coffee-brown markings broadly edged with white. Primaries with a reniform spot closing the cell; the postmedian series nearly erect, slightly irregular and composed of six broad spots, the lowest one being smallish; this series is broadly edged externally with white, and is directly followed by the submarginal row of six reniform spots, a marginal row of broadish dashes more or less confluent. Secondaries, with five small black spots near the base, four below each other, the two middle ones being shifted slightly inwards, and one on the inner margin nearer the base, a sixth larger black spot is in the middle of the costa below vein 8; the postmedian very irregular series is confluent with the spot closing the cell, and is composed of six spots or broad dashes, the second and third very long confluent with the cell spot, the fourth small narrow wedge-shaped, fifth larger shifted inwards, seventh irregular shifted slightly outwards; a broad band of white follows; a series of eight large irregular submarginal spots, the eighth very small on the inner margin between veins 1 and 1*a*; a marginal series of five smallish spots in a white area; a subanal black spot with blue metallic scales and a trace of a similar smaller anal one.

♀. Upperside, both wings brown with the basal two-thirds of the wing up to the upper margin of the cell bright violet blue—otherwise as in the male.

Expanse, ♂ 40–45; ♀ 45 mm.

Hab. Cape Colony; Natal; Kaffirland.

Type Paris Museum ??.

This is the species that Trimen described as *caffrariae*, as he considered another closely allied insect to be *asteris* of Godart. A reference, however, to that author's description shows quite definitely that Trimen misidentified Godart's species. I therefore transcribe the original description.

"137. *Polyommate Asteris.*

"*Polyommatus Asteris.*

"Polialis suprà argenteo-violaceis, nitidis, limbo fusco: posticis subtus obscure cinereis, punctis sex baseos ocellaribus nigris, fasciâ disci crenatâ albâ ocellisque tribus anguli ani caeruleo-argenteis.

"Il a un peu plus d'un fonce et demi d'envergure. Le dessus du mâle est d'un violet-argenteis luisant, avec le limbe postérieur brun et frangé de blanc. Les ailes supérieures ont vers le milieu une lunule noirâtre, et les inférieures offrent vers l'angle de l'anus un point noir surmonté d'une lunule fauve.

"Le dessous des premières est d'un cendré-clair depuis la base jusqu'au-delà du milieu, avec un anneau central blanc; ensuite d'un cendré-obscur jusqu'au bout, avec quatre lignes blanches, transverses et ondulées.

"Le dessous des secondes ailes est entièrement d'un cendré-obscur, et il présente les caractères qui voici: à la base sont six points noires cirelés de blanc et suives d'une ligne blanche très-flexueuse; vient ensuite une bande blanche transverse, crénelée sur chaque côté, puis une serie terminale d'annuleto blancs, dont les trois plus intérieures renfermant chacun un oeil noir sablé de bleu-argenté. L'oeil qui fait face à la queue est surmonté, comme en dessus, d'une lunule fauve.

"La femelle a le dessus plus pâle, avec la bordure plus large et marquetée de blanchâtre. Son dessous est comme chez le mâle Pris au Cap de Bonne-Esperance près de la montagne de la Table, par M. Jules Verreaux, preparateur de Zoologie au Museum d'Histoire naturelle de Paris."

It will at once be seen on reading the above description that the upperside is *shining*, this is referred to both in the Latin diagnosis and in the French detailed description; whilst in the latter it is said that there is a transverse band of white on the underside of the secondaries, which is not the case in the species Trimen identified as *asteris*; neither is it in the least lustrous on the upper surface. These two important points show conclusively that *caffrariae* Trimen must sink as a synonym to *asteris* Godart.

Genitalia small for the size of the insect: harpagines generally asymmetrical, of the usual arm-like form, with the base broader but tapering rapidly into a thin arm-like process, highly concave on the lower margin, nearly straight on the upper, terminating in a hooked apex with longish curved bristles; it will be seen from the figure that one harpago is shorter and broader than the other; anellus with the front edge well arched; aedoeagus broad, of only moderate length; cingulum fairly ample; tegumen a narrow raised ridge at the rear with large cheeks curved well forward and having longish bristles; falces of moderate size.

Androconia very numerous, a very long oval with eleven rows of reticulations placed fairly closely together, the sculpturing of which is also close vertically.

Neochrysops trimeni sp. n. Plates XII, fig. 7; XVI, fig. 13; XXVII, fig. 13.

Lycaena asteris Trimen (*nec* Godart), S. Afr. Butt., ii, p. 24, Pl. 8, figs. 3, 3*a* (1887).
Lycaena celaeus Trimen, *in parte*, Rhop. Afr. Austr., p. 247 (1866).
Cupido asteris Aurivillius, Rhop. Aethiop., p. 372 (1898).
Catochrysops asteris Butler, P.Z.S. Lond., p. 192 (1898).

♂. Upperside, both wings dull violet bluish. Primaries with a broadish brown termen and a brown dash closing the cell. Secondaries with a marginal series of five or six brown spots, the subanal one being blackish edged internally with yellow, with short black tails. Underside, both wings darkish brown with darker spots and marks finely and definitely edged with white. Primaries with a large reniform spot closing the cell, followed closely by the postmedian series of seven spots, the first on the costa very small, the rest large and oval or suboval, the fourth elongated to touch the cell spot, the sixth shifted inwards, the seventh directly below it and sometimes succeeded internally by one or two very small dots (Trimen's figure shows an internal elongation of this spot), a submarginal series of six large reniform spots followed by a marginal series of five or six narrow oval marks. Secondaries with five dark brown spots near the base, four below each other, the two central ones smaller and oblique, the fifth nearer the base on the inner margin; a large subreniform spot closes the cell above, which on vein 8 is a large brown spot, usually black in other species, but brown in this; the postmedian series composed of six spots, the second, third and fourth confluent, the second and third long, touching the cell spot, the fifth shifted inwards, sixth outwards; a submarginal series of broad lunules, followed by a marginal series of spots, the subanal one black with metallic scales and edged with yellow.

♀. Upperside, both wings brown with the basal three-quarters brightish violet blue, otherwise as in the male.

Expanse, ♂ 41; ♀ 45–48 mm.

Hab. Cape Colony.

Types in the Joicey collection.

This is the species that has hitherto passed in all collections as *asteris* Godart.

Genitalia. Harpagines with oval base tapering into a long arm-like process concave on the lower margin and slightly convex at the upper, excised near the tip into a strong sickle-like apex; the bristles are long and strong; anellus highly arched at the front edge; aedoeagus short, of moderate width; cingulum narrow and longish; tegumen a narrow ridge at the rear with lobe-shaped cheeks produced well forward, having an abundance of long bristles; falces long, with the apical two-thirds narrow.

Androconia rather large, of a somewhat broad, oval shape, with the distal extremity slightly conical, ten or eleven rows of reticulations placed well apart, with the sculpturing fairly close vertically.

Neochrysops grahami Trimen. Plates XVI, fig. 14; XXVII, fig. 14.

Lycaena grahami Trimen, Trans. Ent. Soc. Lond., p. 123, Pl. 8, figs. 1, 2 (1893).

Cupido grahami Aurivillius, Rhop. Aethiop., p. 373 (1898).

♂. Upperside, both wings pale fairly bright (not shining) violet blue, with the cells closed by a fine brown line and the termen finely brown. Secondaries with a small black subanal spot, no tails. Underside, both wings pale dove grey, with darker spots and marks edged with white. Primaries with a spot closing the cell, beyond which is the slightly curved postmedian series of six large spots (a very minute one on the costa might make seven, but it is not always present) more or less confluent, but with their edges irregular, followed immediately by the submarginal row of mitre-shaped spots, the upper three being small; a trace of a terminal row of spots. Secondaries with five spots near the base, the upper one dark brown, not black, another dark brown one on the costa near the apex; postmedian series, confluent with the spot closing the cell, very irregular, the second spot is long and shifted outwards, the third and fourth are smaller and are confluent with the cell spot, fifth and sixth larger and irregular, the whole of this series is confluent and is followed by a broad whitish band, which edges internally the sublunular submarginal series that is barely separated by a trace of a fine pale line from the terminal row of largish spots; a small black subanal black spot with metallic scales.

♀. Upperside, both wings brown. Primaries with the violet-blue area restricted to just over half the area of the wing, with a largish spot closing the cell. Secondaries with only a few blue scales at the base, otherwise like the male.

Expanse, ♂ 40; ♀ 43 mm.

Hab. Cape Colony; Natal.

Types in the Joicey collection.

Genitalia. Harpagines a narrow arm-like process, wider at the base, but tapering down rapidly, lower margin concave, upper margin convex, tip somewhat excised to form a slightly hooked apex; the bristles are long and strong but few in number; anellus with front edge almost erect; aedoeagus long and of a moderate width; cingulum long, bent forwards, less narrow than usual; tegumen a narrow ridge at the rear with small lobe-shaped cheeks produced well forward, having a fair supply of fine bristles; falces large and broadish.

Androconia of two shapes—one, apple-shaped with the diameter from side to side much longer than the line of axis, with about sixteen rows of reticulations fairly close together, with strongly marked sculpturing placed vertically moderately closely; the other almost tulip-shaped with twelve or thirteen rows of reticulations similarly placed and sculptured.

Neochrysops ortygia Trimen. Plates XVII, fig. 15; XXVII, fig. 15.

Lycaena ortygia Trimen, S. Afr. Butt., ii, p. 26 (1887).
Lycaena asteris Trimen (*in parte*), Trans. Ent. Soc. Lond., p. 361 (1870).
Cupido ortygia Aurivillius, Rhop. Aethiop., p. 373 (1898).
Lycaena ortygia Trimen, Trans. Ent. Soc. Lond., 1906, p. 74, Pl. v, figs. 9, 9*a* (1906).

♂. Upperside, both wings pale bright violaceous blue, brighter than in *grahami*, with brown lunules closing the cells, fringes tessellated white and brown. Primaries with termen broadly brown. Secondaries with the termen having a row of six semi-lunular spots, the subanal one being black. Underside, both wings cinder brown, with darker spots definitely edged with white. Primaries with a spot closing the cell, followed by the postmedian row of seven spots slightly curved, of which the first below the costa is very small, the rest large, somewhat oval and rather irregular, the submarginal row composed of six reniform spots, the terminal row almost confluent. Secondaries with five prominent blackish spots near the base, four below each other, the two central ones oblique, the fifth near the base on the inner margin, a sixth blackish spot shifted right out nearer the apex; the postmedian series, touching the spot that closes the cell, composed of six oval spots, the second and third shifted outwards, the fourth well inwards, small, the fifth largish, inwards again, the third to the fifth touch the cell spot, sixth shifted outwards reniform and large; the submarginal row composed of lunular marks edged internally with

sagittate white marks, a terminal row of spots, a large black subanal spot with metallic blue scales and a fine edging of yellowish.

♀. Upperside, both wings brown. Primaries with the basal three-quarters bright violet up to half of the cell. Secondaries with the basal three-fifths bright violet up to vein 6. Otherwise like the male.

Expanse, ♂ 44; ♀ 50 mm.

Hab. Cape Colony; Transvaal.
Type in the Joicey collection.

Genitalia. Harpagines shortish of the usual shape, tapering very rapidly from an almost oblong base, highly concave on the lower margin, almost straight along the upper margin, quite suddenly excised near the apex into a broad sickle-shaped extremity, long bristles mostly congregated at the base and apex; anellus with very slightly curved front edge; aedoeagus short and broad; cingulum bent forward, of moderate dimensions; tegumen a narrow ridge at the rear with cheeks, rather small, produced well forward, with numerous bristles; falces long and of moderate width.

Androconia oblong, more broadly curved distally than proximally, with nine or ten rows of reticulations placed far apart, with the sculpturing placed vertically far apart also.

Neochrysops lerothodi Trimen. Plate XVII, figs. 16, 16*a*.

Lycaena lerothodi Trimen, Trans. Ent. Soc. Lond., p. 242, Pl. 19, fig. 6 (1904).

♂ and ♀. Upperside, both wings uniformly brown with a slight brassy lustre in certain angles of light, fringes paler with a whitish patch at the apex of each wing. Underside paler than the upper, with darker spots palely encircled. Primaries with a spot closing the cell; the postmedian series consists of six spots, the upper five being in a slight curve, whilst the two uppermost spots of these five are smaller than the others, the sixth spot is shifted well outwards, the terminal and subterminal rows are very obscure, but the latter is edged internally by a row of narrow white internervular dashes. Secondaries with four blackish spots near the base, the fourth smaller one on the inner margin being nearer the base, a fifth black spot is beyond the centre below vein 8; the postmedian series is strongly curved at the second spot, the first spot being shifted well outwards of the black spot below vein 8, the second further out, the third slightly inwards, but larger and somewhat oval, the fourth small and inwards, the fifth well inwards, the sixth outwards, this row has the inner white edge accentuated, the very

indefinite submarginal row of spots is broadly edged internally with a series of similarly coloured brown crescents, which are broadly edged with a series of white sagittate marks, the dividing line between the submarginal row of brown spots and its internal brown edging is very difficult to discern; the brown termen is finely edged with white internally.

Expanse, 37 mm.

Hab. Machacha (Mahiti Range); Basutoland (*Crawshay*).

Type in the British Museum.

Genitalia. Harpagines slightly oval at the base, of nearly even width from beyond the oval base, moderately long, curved with the apex suddenly excised into a short sickle-shaped termination, bristles are evenly distributed up to the origin of sickle; anellus evenly but slightly rounded on its front line; aedoeagus shortish and decidedly broad; cingulum of moderately broad dimensions; tegumen a narrow collar with projecting cheeks, which are furnished with fine bristles; falces large and strong and deeply curved.

Androconia. This is one of the few species without any of these scales.

Neochrysops gigantea Trimen. Plate XIII, fig. 1; XVII, fig. 17; XXVII, fig. 17.

Lycaena gigantea Trimen, Trans. Ent. Soc. Lond., p. 4, Pl. i, figs. 2 and 3 (1898).
Catochrysops hypoleucus Butler, P.Z.S. Lond., p. 907, 1898.
Cupido giganteus Aurivillius, Rhop. Aethiop., p. 377 (1898).
Catachrysops giganteus Neave, P.Z.S. Lond., p. 58 (1910).

♂. Upperside delicate pinkish lilac blue with a black dash closing the cell of the primary, and fine black margins. At the anal angle is a trace of a twin spot, followed in the next interneural space by a dark marginal spot with traces of yellow edging above and very faint metallic scaling. The spots of the underside pattern show through. Fringes black with greyish extremities, and a black tail at the end of vein 2. Underside. Primaries white with faint yellowish tone in the basal area. A large reniform black spot closes the cell, beyond which is the postmedian series consisting of seven black spots, the three nearest the costa projected outwards, followed by a long black dash extending out nearly to the submarginal line, fifth and sixth spots inclined well inwards, seventh twin spot projected well outwards on the fold; beyond this series is the submarginal, well-marked subcrenulate broadish black line,

margin finely black. Secondaries yellowish with black markings; a series of three or four black subbasal spots, the three are largish, but there is often a small one in the middle just below the cell; a large reniform spot closes the cell; an irregular and highly curved postmedian series, the first four projected well outwards, the fourth being elongated, fifth and sixth inwards, seventh outwards, eighth inwards; a submarginal somewhat crenulate black line interrupted between veins 2 and 3 by an orange crescent; anal spots as on upper surface except that they have an ample sprinkling of bright blue metallic scales.

♀. Upperside whitish grey fairly well but thinly covered with violet bluish scales; a very large spot closing the cell of the primaries, and a broadish brown submarginal band, crenulate in the secondaries, with whitish outer edging. Underside as in the ♂.

Expanse, ♂ 54–60; ♀ 58–64 mm.

Hab. Mashonaland; Victoria Nyanza; Northern Rhodesia.

This is the largest and one of the most beautiful of the group, and should be recognised at a glance.

Genitalia. With the harpagines long and narrow, somewhat concave on the lower margin, with the upper margin excurved beyond the middle, having irregular tubercles from which arise fairly strong spines; the apex is suddenly excavated into the shape of a strong, fairly large, sickle-shaped termination, having a few minute teeth at the basal section; the spines are not numerous, and are mostly gathered to the excurved portion. The cingulum is narrow for its whole length, but expands somewhat as it nears the tegumen, smallish, excavated almost throughout its dorsal edge, leaving only a narrow collar at its rear to connect its two cheeks; the falces are of moderate width, curved, very long, with a small sharp hook at the extremities; the cheeks are plentifully supplied with fine hairs or spines; aedoeagus of moderate length, rather shorter than long, and rather wide; vesica simple, without teeth or shagreening.

Androconia or battledore scales of only moderate size, oblong, with an occasional oval one here and there, very finely reticulated or shagreened, with twelve to fourteen (rarely fourteen) rows of reticulations.

Neochrysops stormsi Robbe. Plates XIII, fig. 2; XVII, fig. 18; XXVII, fig. 18.

Lycaena stormsi Robbe, Ann. Ent. Belge., p. 132 (1892).

Cupido stormsi Aurivillius, Rhop. Aethiop., p. 378, Pl. 6, fig. 5.
Catachrysops stormsi Neave, P.Z.S. Lond., p. 58 (1910).

Both sexes of this species are quite similar above to *giganteus* Trimen, except that they have no tails at the anal angle of the secondaries. On the underside of the primaries the spot in the postmedian series between veins 4 and 5 is round, not elongate, and is in line with the previous spots, whilst the submarginal dark line is crenulate, not almost straight as in Trimen's species. Secondaries: the spot in the postmedian series between veins 4 and 5 is not elongated out of line with its predecessors, and the crenulate submarginal dark line ceases at vein 4, whilst in *giganteus* it is intermittently continued to the inner margin. In size the two species are similar.

Hab. Congo; Tanganyika; West Lualaba.

Genitalia with the harpagines rather narrower and the terminal sickle larger and slenderer than in *giganteus;* the aedoeagus is also rather slenderer, otherwise these organs are closely similar to that species.

Androconia variable, generally smaller than with the preceding species, occasionally oblong, sometimes oval, with about twelve rows of reticulations, the dots (reticulations) being well separated vertically.

Neochrysops mashuna Trimen. Plates XIII, figs. 3 and 4; XVIII, fig. 19; XXVII, fig. 19.

Lycaena mashuna Trimen, P.Z.S. Lond., p. 48 note (1894).
Cupido mashuna Aurivillius (as a syn. of *stormsi*), Rhop. Aethiop., p. 378 (1898).

♂. Both wings, upperside, slightly iridescent greyish lilac, with all the veins showing finely blackish and a rather prominent dark crescent closing each cell. The secondaries have a dark marginal spot in the interspace of veins 2 and 3, with traces of yellow around. Underside. Both wings creamy grey, sometimes dirty grey. Primary with a black spot edged with white closing the cell, followed by the postmedian series of similarly coloured spots, the three upper ones in a slight arc, the fourth shifted inwards, fifth inwards again, below which and slightly outwards is another small spot, sometimes single, sometimes double and sometimes absent; there is no dark marginal or submarginal row. Secondaries with a black basal spot edged with white below vein 1, three subbasal spots below

each other, a crescentic mark closing the cell, a series of eight postmedian spots, the first costal spot above that closing the cell, the second shifted far out, third shifted slightly outwards, fourth oblique, fifth and sixth each shifted well inwards, seventh lunular somewhat outwards, eighth on the inner margin well inwards—a black marginal spot in the interspace of veins 2 and 3 with a trace of yellow internal edging, a very faint trace of a whitish crenulate line, followed externally by a second less crenulate.

♀. Upperside. Both wings brownish. Primaries with cell and fold pale iridescent bluish, outer discal area somewhat whitish, with very broad posterior brown borders. Secondaries with the basal half of the wings iridescent bluish, the underside marks showing through prominently except the subbasal spots. Underside as in the male, but the ground-colour more pronounced in tone.

Expanse, ♂ 34–38; ♀ 42 mm.

Hab. Mashonaland, 4200 to 4300 feet.

Type in the British Museum.

This is a very well-marked species, and it is rather incomprehensible how Aurivillius can have mixed it up with *stormsi*—a species more than twice its size and very different in many respects.

Genitalia with the harpagines similar to *giganteus*, but proportionately broader and except at the very base of fairly even width: the terminal sickle is smaller and shorter and slightly toothed. They have a fair supply of longish stiff bristles at the base on the lower edge, and a less supply on the upper surface in front of the hook; the shape of the anellus that is attached to the furca is more rounded on its front edge than either *giganteus* or *stormsi*, both of which are somewhat wedge-shaped; aedoeagus of moderate length, but of rather narrower width; the cingulum and the tegumen do not call for special remark, but the hook terminating the falces is quite small.

Androconia of fair size, variable, but the average are slightly tapered proximally to the broader distal end, which is moderately arched, whilst the distal end tapers rapidly into the footstalk; there are about eleven rows of fine reticulations placed rather closely together.

Neochrysops rhodesensae, sp. n. Plates XIII, fig. 5; XVIII, fig. 20; XXVII, fig. 20.

♂. Upperside, both wings pale greyish lavender colour, decidedly less bright than in *mashuna*, veins finely black, more prominent

than in the previous species; a dark rather indefinite lunule closes each cell. Secondaries with an indefinite dark marginal spot in the interspace of veins 2 and 3. Underside, both wings white with black spots, sufficiently white to almost obliterate the usual white edging to the black spots. Primaries with a good-sized reniform spot closing the cell, followed by a short postmedian series of four spots terminating between veins 3 and 4; the four spots are arranged in a slight curve, and the third from the costa is placed obliquely; a submarginal crenulate line, indefinite towards the apex. Secondaries with a basal spot on the inner margin, two subbasal spots below each other, a largish lunular spot closing the cell; an irregular postmedian series of eight spots, the first largish on the costa over the lunular cell spot, the second shifted far out, being one of three placed in an arc, fifth spot shifted well inwards, sixth inwards again, seventh largish, sublunular, well outwards, eighth far inwards on the inner margin—this might be mistaken for a third subbasal spot, but correctly it forms one of the postmedian series—a submarginal crenulate-yellowish line, faint towards the apex and edged internally with dark brown in the anal area, where the yellow is extended, a small dark marginal spot in the interspace of veins 2 and 3.

Expanse, 42 mm.

Hab. Fort Jamieson, N.E. Rhodesia (*Langshaw*).
Type in my collection.

Genitalia with the harpagines slightly hollowed in the centre and with the sickle termination much more tapered from nearer the base, whilst the hook itself is also rather larger than in *mashuna*; the bristles in the fore part of the clasps are stronger, larger and more abundant than in that species; the shape of the anellus is more pointed; the falces somewhat heavier, and the aedoeagus decidedly narrower than in Trimen's insect.

Androconia. Broadly oblong, tapering slightly, wider distally, rather small; the distal edge flatter than the proximal; eleven rows of reticulations, which are placed well apart; footstalk long.

Neochrysops delicata, sp. n. Plates XIII, figs. 6 and 7; XVIII, fig. 21; XXVII, fig. 21.

♂. Upperside. Both wings pale French grey with a delicate silvery lavender gloss, veins finely blackish, cell closed by a blackish crescent, prominent in the primaries, fine in the secondaries, no tails. Primaries with termen broadly and indefinitely brown, in which is a more or less distinct row of submarginal lunules. Undersurface. Primaries whitish tinged with yellow on the costa and

termen, with black spots whose white edging almost disappears in the ground-colour; a black sublunular spot closes the cell; the postmedian series consists of eight spots, two minute ones below the costa, very occasionally absent, the fourth spot shifted slightly out from the third, fifth oblique and extended outwards, sixth inwards, seventh inwards, quite small, eighth also small outwards; a submarginal series of yellowish lunules, the three lowest ones near the tornus edged internally with blackish, in other specimens the whole series is edged prominently with blackish internally. Secondaries whitish tinged with ochre yellow, variable in its depth of colour with white encircled black spots, a basal spot on the inner margin, two subbasal spots below each other; cell closed by a prominent sublunular spot; the postmedian series consists of eight spots, the first below the costal vein over the sublunular cell spot, second shifted right outwards, third and fourth well outwards, the latter placed obliquely, fifth well inwards, sixth inwards, seventh (sublunular) outwards, eighth well inwards; a submarginal row of yellowish lunules edged internally with blackish crescents, sometimes very faint as they approach the apex; a black marginal spot between veins 2 and 3 edged internally with yellowish or orange colour, above which is a marginal row of yellowish spots or dashes.

♀. Upperside. Primaries like the male, but surrounded by very broad brown margins. Secondaries almost entirely brownish, with the marginal series of spots showing through. Underside like the male. One specimen is entirely brown with only a trace of a pale discal area.

Expanse, ♂ 40; ♀ 39–42 mm.

Hab. Nyasaland, Mlanje; Portuguese East Africa. Ruo and Kola Valleys 1700 to 2000 feet, November and December.

Types in the British Museum (*S. A. Neave*).

This species is very nearly related to the previous one, and that is nearly related to *mashuna* Trimen; but I have no doubt that they are all distinct, this being proved both by the genitalia and the androconia.

Genitalia with harpagines very similar to the previous species, but with the sickle termination less rugged, decidedly more abrupt, and the hook smaller; the bristles are less abundant and much finer. The aedoeagus is rather shorter and not so narrow; the cingulum, tegumen and falces, are as is usual in this genus so similar that it is scarcely wise to attempt much differentiation.

Androconia broadly oblong, parallel laterally, distally and proximally almost similarly arched, perhaps slightly flatter distally;

foot stalk long and rather fine; ten to twelve rows of fine closely placed reticulations.

Neochrysops peculiaris Rogenhofer. Plates XIII, fig. 9; XVIII, fig. 22; XXVIII, fig. 22.

Chrysophanus (Hb. *Polyommatus* Auct.) *peculiaris* Rogenhofer in Baumann's Usambara, p. 331 (1891).

Catochrysops perpulchra Holland, Entomologist, Suppl., p. 90 (1892), *id.* Proc. U.S. Nat. Mus., p. 239, t. 7, fig. 7 (1895), *id.* Butler, P.Z.S. Lond., p. 828 (1897).

Castalius hypoleucus Butler, P.Z.S. Lond., p. 660 (1894), *id. l.c.*, p. 403 (1898).

Lycaena exclusa Trimen, P.Z.S. Lond., p. 47, Pl. vi, fig. 11 (1894).

Catochrysops perpulchra Holland, Butler, P.Z.S. Lond., p. 403 (1898).

Catochrysops hypoleucus Butler, Marshall, P.Z.S. Lond., p. 907 (1898).

♂. Upperside. Both wings pale brownish grey with a slight bronzy gloss, spots of underside showing more or less through (less rather than more). Primaries with a dark dash closing the cell. Fringes dark edged externally with white. Underside. Both wings greyish white, in very fresh specimens tinged partially with yellow, with black spots whose white edging is almost lost in the ground-colour. Primaries with a spot closing the cell; postmedian series consisting of six irregular spots, the third placed obliquely, generally but not always, fourth shifted inwards, fifth inwards, sixth very small, sometimes double, often absent; a submarginal greyish irregular line. Secondaries. A largish basal spot on the inner margin, two subbasal ones below each other, a lunular mark closing the cell; postmedian series consisting of eight spots, first below the costal vein, second shifted well outwards, third and fourth well outwards, fifth well inwards, sixth inwards, seventh lunular outwards, eighth well inwards on vein 1; a subbasal crenulate darkish line, sometimes almost absent, a small black spot at anal angle and between veins 2 and 3, with yellow above them and traces of metallic scales.

♀. Differs from the male in that on the upperside, the cell, the fold, and the greater part of the radial area are covered with pale blue superimposed scales: there is also a fairly prominent submarginal crenulate brown streak, which, however, is occasionally absent, and a spot or spots in the anal area with yellow above. The underside is like the male.

Expanse, ♂ 38–48, ♀ 46–52 mm.

Hab. Manicaland, Nyasa District, British East Africa; Usambara, Kilimanjaro, Victoria Nyanza; Mombasa, Rabai, Sagalla (*St. Aubyn Rogers*), Nairobi (*Tytler*), Fort Jamieson, N.E. Rhodesia (*Langshaw*); Mashonaland.

Genitalia. Harpagines long with a suboval basal area tapering rapidly off quite narrowly in the centre, when it expands rapidly again into a short strong hook, the upper part of which is formed by a sudden and deep excision of the upper edge near the termination; the hook itself is toothed both externally and internally. Aedoeagus long and narrow compared with *giganteus*; the anellus part of the furca is cone-shaped; the falces are shorter than usual and moderately broad. The harpagines are well supplied with long stiff bristles at the base, but more sparingly in the middle and at the apex.

Androconia roundish, perhaps more correctly a broad oblong, as broad as long, with fourteen rows of closely-placed reticulations; the distal contour a broad arc, the proximal tapering off into the foot stalk like a pear. The size and shape are somewhat variable, some few scales are as nearly round as possible, and a few are a longer oblong.

Neochrysops cupreus Neave. Plates XIII, fig. 11; XVIII, fig. 23; XXVIII, fig. 23.

Catochrysops cupreus Neave, P.Z.S. Lond., p. 58, Pl. 2, figs. 9♂, 10♀ (1910).

♂. Upperside, both wings brown with a curious and beautiful coppery bronze lustre, the cells closed by a black dash, fringes black with grey extremities. Secondaries with two marginal black spots at the anal angle, edged internally with pale metallic blue. Underside. Primaries whitish with the costal and terminal areas yellowish; the spots are black with white edging. Cell closed by a lunule; postmedian series composed of six internervular spots, the third placed obliquely outwards, the fourth well inwards, fifth inwards often oblique, sixth composed of two black points, which in the female are united and form a fair-sized spot. Secondaries ochreous, a black basal spot on the inner margin, two subbasal spots below each other, the lower one as usual in the middle of the cell; a large subtunular spot closes the cell; postmedian series composed of eight spots, the first below the costal vein, and the second shifted outwards, largish, third and fourth shifted outwards, slightly fractured, fifth well inwards, sixth inwards, seventh angular spot slightly outwards, eighth well inwards on the

inner margin; anal spots as on the upperside, but edged in addition internally with sublustrous orange.

♀. Upper side. Both wings lustrous pale blue with very broad brown costal and terminal margins. Primaries with a prominent large black spot closing the cell; in the tornal area of the brown termen are three internervular whitish marks. Secondaries with a black spot closing the cell, followed by two or three black post-median spots, above vein 4; terminal area with a series of brown spots in a whitish setting; anal spots as in the male. Underside as the male.

Expanse, ♂ 48–50; ♀ 52 mm.

Hab. Mansya River, and Chambezi Valley, N.E. Rhodesia, 4500 feet, November.

Types in the British Museum.

This species does not appear to have been recorded from any other source except Mr. Neave's original captures.

Genitalia. Harpagines shorter than usual, moderately broad and fairly even in width, apex terminating in an ample simple large hook, not so sharply excised as the preceding species into the sickle-shaped extremity, but rather in a billhook shape, with an abundant supply of long bristles, especially at the base; aedoeagus of moderate length and dimensions, and of even width. Tegumen small.

Androconia roughly pear-shaped, broad, not symmetrical: distal extremity more or less evenly arched, with seventeen to eighteen rows of reticulations in the widest part, the reticulations not placed too closely vertically.

Neochrysops neavei, sp. n. Plates XIII, figs. 8 and 10; XVIII, fig. 24; XXVIII, fig. 24.

♂. Upperside, both wings greyish brown (much darker than *peculiaris*) with prominent black lunular marks closing the cells. Fringes black with paler extremities. In the secondaries an inconspicuous blackish marginal spot between veins 2 and 3. No tails. Underside, both wings cream colour with veins somewhat ochreous, spots black encircled with white. Primaries with a large spot closing the cell; postmedian series consisting of six spots generally, but this is variable, the upper four in an even curve, fifth vertically below the fourth, the sixth a twin spot shifted outwards; an internervular submarginal row of sublunular marks; a trace of a marginal row of subochreous dashes. Secondaries with a prominent basal spot on the inner margin; a series of two or three

subbasal spots below each other; the spot in the cell is sometimes a double spot, sometimes a single one, therefore I describe the number as two or three; a prominent lunule closes the cell; the postmedian series consists of eight spots of which the upper six form a deep curve, the seventh is shifted well outwards, and the eighth well inwards on vein 1, so as to appear to be part of the series of subbasal spots; a series of sublunular submarginal marks, that between veins 2 and 3 being orange not black and forming the orange internal edging to the black marginal spot between those veins; it has a narrow exterior edging of metallic scales, a trace of a marginal series of ochreous grey dashes, these are more prominent in the females.

♀. Upperside, both wings brownish with the whole of the discal and three-quarters of the inner marginal areas whitish, having superimposed pale blue lustrous scales; the cells closed by prominent black spots, and in the secondaries there is a marginal row of spots with crenulate brown internal edging—otherwise like the male.

Expanse, ♂ 48–50; ♀ 48–52 mm.

Hab. Portuguese East Africa, Foothills North of Mount Chiperone, 2500 feet, November and December; one ♀ Mlanje, Nyasaland, in January. All Neave's collecting.

Types in the British Museum, 2 ♂ and 4 ♀.

This species is very near in general facies to *peculiaris*, but is much darker above and can be recognised at once by the pattern of the underside, in which the postmedian series of spots never has the third spot oblique, it being always round and forming in line part of the curve already referred to.

I dedicate this species to the discoverer of it (Mr. S. A. Neave), whose travels in Africa have done so much to elucidate its insect fauna.

Genitalia. Harpagines simpler than any of those at present referred to; they are widest near the base, gently ascending in an outward arch and tapering off gradually into an upturned fine point, there being no excavated sickle-shaped extremity, with a plentiful supply of long stiff bristles on the upper side of the terminal half and a more limited supply at the base; the harpagines are rather shorter than usual; the aedoeagus is of moderate length, fairly wide, with the anellus having the front edge less sharply excurved and with a broadly recessed collar; the tegumen is deeply excised fore and aft, leaving a high narrow saddle-like ridge; the cheeks being squarish, of moderate size, with large broadish falces

tapering off into quite narrow extremities having a finely hooked tip.

Androconia rounded, slightly truncated proximally to the stalk, often slightly flattened at the distal edge, with thirteen somewhat appressed rows of closely-placed, fair-sized reticulations.

Neochrysops dollmani, sp. n. Plates XIII, fig. 12; XIX, fig. 25; XXVIII, fig. 25.

♂. Upperside, both wings pale greenish subdued electric blue, with the underside markings showing faintly through, and with very broad brown margins. Fringes brown with paler extremities. No tails. Primaries with a dark dash closing the cell. Secondaries with a marginal row of dark spots in the dark terminal area, a deep black spot between veins 2 and 3, edged externally with pale metallic blue and broadly internally with orange, a trace of a smaller double similar spot at the anal angle. Underside, both wings pale greyish with blackish spots encircled with white. Primaries with a dark dash closing the cell, followed by the postmedian series of six spots, the sixth very minute and may be a double one, the first five spots form a fairly even arc, with the fifth shifted slightly inwards; a marginal and submarginal row of six internervular pale brownish dashes separated from each other by a white stripe, interrupted at the veins. Secondaries with a basal spot on the inner margin; a series of three or four subbasal spots below each other, the spot just below the cell adjacent to the middle spot may be absent, when of course there will be three spots, not four; cell closed by a large angled spot, above which on the costa is another spot; the postmedian series consists of six prominent blackish spots, the first shifted well outwards, the second slightly outwards, the third slightly inwards, fourth small and compressed within the angle of veins 3 and 4, fifth well inwards, sixth almost reniform, slightly outwards; a marginal row of pale brownish spots set in white and bordered internally with a row of similar coloured lunules; a black spot, veins 2 and 3 with blue metallic scales and a largish internal edging of orange; similar small twin spots at the anal angle.

Expanse, 44 mm.

Hab. Solwezi, Rhodesia (*H. Dollman*).

Type in the British Museum, co-type in my collection.

Two males were brought home by Hereward Dollman, taken in December 1917. It is a beautiful and quite unmistakable species, and forms an almost perfect link between the black spotted and the brown spotted, or

typical section: the genitalia are allied to the former group, as would perhaps be expected. The female is as yet unknown.

Genitalia with the harpagines of moderate length and width, almost as wide at the sickle excavation as at the base; under edge concave, upper edge rugged and slightly uneven; excavation sudden, with a long hook at the apex. A plentiful supply of longish strong bristles both at the base and the front where the excavation occurs, only a few in between; furca of moderate size; anellus with the front edge nearly straight; aedoeagus not very long, fairly stout; cingulum angled somewhat forwards; tegumen not large, with cheeks smaller than usual, not very deeply excised; falces shorter than in most species.

Androconia not variable oblong, straightish laterally, highly arched, almost to a central point distally, evenly and well arched proximally to a central attachment stalk, with nine or ten rows of reticulations placed well apart both horizontally and vertically.

I have dedicated this beautiful species to my dear friend Dollman, whose untimely and sad death so many of us deplore. A brilliant career in life, without doubt, lay before him, and one sincerely regrets its unusual brevity.

Neochrysops intermedia sp. n. Plates XII, figs. 4 and 5; XIX, fig. 26; XXVIII, fig. 26; XXXII, fig. 62.

♂. Upperside. Both wings golden brown with a subdued lilac lustre and narrow brown borders; the spots of the underside show more or less through. Fringes brown with paler extremities. Primaries with a fair-sized spot closing the cell. Secondaries with an indistinct marginal spot between veins 2 and 3. Underside. Both wings pale grey with blackish and brown markings encircled or edged with white. Primaries with the spot closing the cell and the postmedian series blackish; of the latter the three upper spots form a series in which the middle spot is projected somewhat outwards, the fourth spot is shifted well inwards, the fifth also well inwards, the sixth is a double spot placed obliquely outwards; a series of six submarginal broad internervular brown dashes near the postmedian series; a marginal, somewhat similar series of five dashes ending at vein 3. Secondaries with a basal black spot on the inner margin, followed by a series of three subbasal black spots, the lowest on vein 1; a black spot below the costal vein forming the first of the postmedian very irregular series of seven spots, all of which are brown except the first, second spot shifted

outwards, third spot outwards and much elongated, fourth slightly inwards and more elongated, fifth very small indeed and shifted well inwards, sixth small and shifted well inwards, seventh spot well outwards and moderately large; beyond this postmedian series is a row of subhastate white marks, a marginal row of brown spots, the fifth between veins 2 and 3 black, with blue metallic scales and having a bright orange iris, anal spot indistinct with blue metallic scales and orange internal edging, a fine tail from vein 2.

♀ Upperside, both wings with a large area of bright violet blue lustre. Secondaries with a double submarginal row of internervular whitish spots, and a largish deep black marginal spot between veins 2 and 3. Underside like the male, only more accentuated.

Expanse, ♂ 40–41; ♀ 43 mm.

Hab. Portuguese East Africa, Ruo Valley, 2000 feet, December; Foothills Mount Chiperone, 2500 feet, end of November.

Types in the British Museum, 3♂ and 1♀ (*S. A. Neave*).

Genitalia similar in general form to *N. neavei*, but smaller. Harpagines with moderately broad subovate bases which rapidly taper to the extremities, the lower margins being deeply hollowed, whilst the upper margins somewhat beyond the base are nearly straight for about half the length, when they are suddenly depressed and recurved upwards, forming deeply hooked apices; there is a plentiful supply of long fine bristles on the lower margins of the base and on the upper margins, excepting the apices themselves; the furea is short; the anellus being pronounced and having an evenly curved front edge; aedoeagus of moderate length and broad; the tegumen is very highly excised from the front, with deep cheeks having straightish front margins; the falces are rather narrow, but as usual long and deeply curved; the front margins are fairly well supplied with longish bristles.

Androconia broadly oval; proximal margin often asymmetrical, owing to attachment stalk not being central; distal margin evenly and moderately highly arched; nine rows of reticulations placed well apart both vertically and horizontally.

There is a moderate amount of variation of the shape of the androconia in this species; generally they are broadly oval, as I have described, being almost, but shortly, oblong; several are quite ovate, several are asymmetrical distally; one is very abnormal, being over double the usual length, elliptic in shape, long and narrow, nearly straight on one

side, but well excurved on the other, with five rows of reticulations visible under the half of the scale, whilst over the remainder the rows are so closely appressed that it is not possible to count them accurately, but approximately there are six or seven. The reticulations are all placed very closely together vertically.

Neochrysops pterou sp. n. (πτερόν, a feather).

♂. Upperside, both wings dull greyish lavender violet. Primaries with a dark dash closing the cell and a narrow indefinite dark border to the termen. Secondaries with the dark border quite narrow, but well defined. Underside, both wings pale grey with slightly darker spots encircled with white. Primaries with the usual spot closing the cell; the postmedian line is rather irregular and is composed of six spots, the third transversely placed and narrowly oval, the fourth is isolated, fifth shifted inwards, the sixth very slightly outwards and erect; a series of broad submarginal interneural dashes palely edged, followed by a similar series of darker interneural marginal marks. Secondaries rather darker than the primaries, with three very small subbasal blackish spots, followed halfway along the costa by a fourth somewhat larger. The cell is closed by an angled dash; the postmedian line is composed of six spots, the second shifted well out, the third somewhat oval and placed slightly transversely, the fourth is shifted inwards, the fifth further inwards, the sixth reniform and shifted outwards; a submarginal row of sagittate interneural dashes, broadly palely edged, followed by a marginal row of large dark spots; between veins 2 and 3 a black marginal spot with metallic blue external and yellow internal edging. No tails.

Expanse, 39 mm.

Hab. Kavirondo Country (*G. E. Feather*), January 30, 1918.

Type in my collection.

There is, unfortunately, but one specimen, but it is so distinctly different from other species that I have no hesitation in naming it, and I therefore dedicate it to its captor.

Neochrysops letsea Trimen. Plates XII, fig. 16; XIX, fig. 28; XXVIII, fig. 28.

Lycaena letsea Trimen, Trans. Ent. Soc. Lond., p. 362. Pl. 6, figs. 3, 4 (1870); *id.* S. Afr. Butt., ii, p. 40 (1887).

Cupido letsea Aurivillius, Rhop. Aethiop., 380 (1898).
Catochrysops fumosus Butler, P.Z.S. Lond., p. 762 (1885).
See also James' Unknown Horn of Afr., p. 239 (1888).

♂ and ♀. Upperside, both wings pale brown with brown fringes edged with whitish; the primaries have the cell closed by an indistinct fine darker dash, and the secondaries have a subanal marginal black spot with yellow internal edging. No tails. Underside both wings pale brownish grey with darker markings edged with white. Primaries with a spot closing the cell; the postmedian series variable, in the male type it is composed of four spots, the first below the costa very minute, the other three almost in line; the submarginal row is absent, and there is only the faintest trace of the terminal series. Secondaries with four black spots near the base, three below each other, and one shifted basewards on the inner margin, a fifth black spot is below the costa near the apex; a curved mark closes the cell, and is followed by the postmedian series of six spots, the upper five being in an irregular curve, the second spot being shifted outwards, the third and fourth each slightly inwards, the fifth more inwards, the sixth outwards; a submarginal lunular series of internervular lunules edged internally with sub-sagittate white marks, a terminal series of spots entirely encircled with white, a subanal black spot with metallic scales edged internally with orange.

The number of spots in the postmedian series of the primaries varies; in some specimens the number is four, the lowest being situated above vein 3; in others there are five, the lowest being above vein 2; the size of these spots likewise differs.

Hab. Cape Colony (Basutoland); Somali; Hope Fountain, S. Rhodesia (*Neville Jones*).

Types in the Joicey collection. The type *fumosus* Butler, a synonym of this species, is in the British Museum.

Genitalia. Harpagines oval, tapering into a moderately long arm-like process, concave on its lower margin, straightish on its upper margin, excised near the tip into a short sickle-like apex; anellus with the front edge erect and waived; aedoeagus of moderate size and width; cingulum bent deeply forward, of moderate width; tegumen a narrow ridge at the rear with smallish cheeks, lobe-shaped and drooping downwards with fine bristles; falces long but otherwise of moderate dimensions.

Androconia somewhat variable in size, of a long oblong shape, evenly curved distally, tapering to the footstalk proximally, with nine or ten rows of reticulations, whose sculpturing is placed far apart vertically.

This appears to be a rare species. Trimen's specimens appear to be but slightly spotted on the underside, whilst those in the British Museum (*fumosus*) are more heavily spotted. I have specimens from Hope Fountain, S. Rhodesia, which are also more heavily spotted, so I have figured Butler's type.

Neochrysops cinerea, sp. n. Plates XII, fig. 17; XIX, fig. 29; XXVIII, fig. 29.

♂. Upperside, both wings pale brownish grey, with the markings of the underside showing through; no spots at all on the upperside except the marginal blackish spot between veins 2 and 3; the narrow dash (almost always present) that closes the cell is in this species only visible as a mark of the underside pattern that shows through. Underside, both wings pale grey, with markings (except the usual black ones on the secondaries) scarcely paler than the ground-colour, encircled with white. Primaries with the spot closing the cell followed by the postmedian series of six almost round spots, of which the sixth is a double one, the upper four spots form a slight arc, the fifth is shifted inwards, and the sixth double one outwards; a submarginal series of six subhastate marks. Secondaries with the black spots very small, the basal one on the inner margin minute, three subbasal ones below each other, and one just below the costal vein; the postmedian series consists of six spots, the first well away from the costal black spot, the second to the fourth in a slight curve touching each other and inclined well inwards, sixth spot shifted outwards; a row of marginal spots with whitish edging bordered internally with a row of lunular internervular marks; a black spot between veins 2 and 3, with metallic scales and an internal edging of yellowish, which is more prominent on the co-type. No tails.

Expanse, 37–40 mm.

Hab. Solwezi, N.W. Rhodesia (*Dollman*), November.

Type in the British Museum; co-type in my collection.

Two males of this interesting species were brought home by Dollman.

Genitalia with the harpagines of moderate length, broadish at the base and somewhat ovate, but rapidly reduced, with the lower edge concave, the top edge nearly straight and suddenly excised at a quarter from the apex into a broad sickle-shaped extremity; a fair supply of long bristles at the base and an abundant supply before the excision, and at the hinder part of the sickle; the furca and anellus

call for no remark; aedoeagus of moderate length, narrow; cingulum angled forward; tegumen small, with small cheeks, which have fairly long and strong falces.

Androconia numerous, large, in shape a long oblong, straightish laterally: the distal edge but slightly curved, generally asymmetrical proximally. They are unusually large and very distinctive.

Neochrysops skotios H. H. Druce. Plates XIX, fig. 30; XXVIII, fig. 30; XXXII, fig. 63.

Catochrysops skotios H. H. Druce, Trans. Ent. Soc. Lond., p. 259, Pl. xiii, fig. 12 (1905); *id.* Neave, P.Z.S. Lond. (1910), p. 57.

♂. Upperside, both wings uniform warm slightly lustrous brown, with no markings whatever except the least trace of the underside spots closing the cells showing through. Underside, both wings greyish brown, with spots scarcely darker than the ground-colour, encircled with creamy white, and the usual black spots on the secondaries. Primaries, a spot closing the cell, followed by the post-median series of six spots, the first four touching each other nearly erect, the fifth and sixth shifted somewhat inwards; a marginal row of internervular dashes edged internally with fine creamy subhastate marks, beyond which is a broader row of internervular dashes also edged internally with a series of subhastate creamy marks. Secondaries with a small basal black spot on the inner margin; three subbasal spots below each other and a fourth shifted outwards below the costal vein; a brown spot closes the cell beyond which is the post-median series of six spots, the first shifted well outwards from the black costal spot, the second to the fifth form a slightly curved series, all touching each other and inclined well inwards, the second of these four spots is placed obliquely generally, sixth spot shifted somewhat outwards; a marginal row of spots and a submarginal row of subhastate dashes each edged internally with rather narrow subhastate internervular creamy marks; a black marginal spot between veins 2 and 3 with blue metallic scales and orange edging. No tails.

Expanse, ♂ 40–42; ♀ 44 mm.

Hab. N.W. Rhodesia.

Type in the Joicey collection; other specimens in the British Museum, Oxford Museum, and in my collection.

Genitalia with the harpagines longish, with base somewhat ovate, rapidly reducing to a narrow arm, concave on the lower edge, straightish on the upper edge; at a full third from the apex curved downwards (not excised) and shortly recurved into a sort of narrow billhook

extremity; some longish bristles at the base and a fair number on the upper margin around the curved section; anellus with a waved front edge; aedoeagus shortish, rather broad; cingulum long, strongly angled forwards over the harpagines; tegumen small, with small cheeks, and long rather narrow falces, which have the extremities sharply curved. The bristles on the cheeks are very numerous, fine and longish.

Androconia very numerous, pomegranate-shaped, but not quite so flat distally, with eleven rows, well apart, of reticulations placed close together vertically; the shape is very fairly uniform and distinctive.

Neochrysops plebeja Butler. Plates XII, fig. 18; XIX, fig. 31; XXVIII, fig. 31.

Catochrysops plebeia Butler, P.Z.S. Lond., p. 192, Pl. 20, fig. 2 (1898).

Lycaena parsimon Trimen (*in parte*), S. Afr. Butt., ii, p. 18 (1887).

Cupido celaeus Aurivillius, Rhop. Aethiop., p. 375 (1898) *in parte*.

♂. Upperside, both wings pale greyish brown, with a few bluish scales at the extreme base; the scales are very thin in substance giving the wings a very slightly diaphanous appearance: the underside pattern shows through more or less. Fringes brown with paler extremities. Primaries with an indistinct dash closing the cell. Secondaries with a black marginal spot between veins 2 and 3 with a trace of blue scales and an orange internal edging. Underside, both wings pale brownish grey, more or less warm in tone, with slightly darker spots and marks broadly edged with white. Primaries with the cell closed as usual; the postmedian series is composed of six spots, sometimes five, which are more or less confluent, the upper three nearly in alignment, the middle one being broken very slightly outwards, the fourth is shifted inwards, the fifth inwards also, and the sixth (sometimes absent) slightly outwards and generally is a small double spot; a marginal row of six lunular spots, preceded by a broad crenulate stripe edged with white on each side. Secondaries with the basal black spot on the inner margin, four black sub-basal spots below each other, the two middle ones being adjacent; a black spot further out below the costal vein; a curved dash closes the cell; the postmedian series consists of six spots or perhaps I should say seven, as there is a fairly visible trace of a spot above the first oblique oval spot which might be numbered 1*a*—it lies between veins 7 and 8, below the apex of the wing-spots

two to four are irregularly in alignment, the fifth spot shifted well inwards, sixth outwards; a marginal row of semilunular spots, preceded by a crenulate stripe, which is edged on both sides with white, the inner edging being broad and sagittate; a black marginal spot between veins 2 and 3 with metallic-blue scales and a broad orange internal edging; a fine tail from vein 2.

Expanse, ♂ 48; ♀ 48–50 mm.

Hab. Natal; Mashonaland; Pondoland; Rhodesia, South, North-east and West; Gazaland; Transvaal.

Type in the British Museum.

Trimen speaks of the insect he calls *parsimon* (*l.c.*) as having tails in both sexes, it is therefore not *parsimon* Fabricius. No doubt he had this species before him.

Genitalia with the harpagines fairly wide at the base, tapering somewhat rapidly into a narrowish arm, concave at its lower margin, nearly straight at the upper margin, suddenly recessed downwards near the tip and recurved into a fair-sized hook at the extremity; the harpagines are longer and the hook larger than is the case with the next species, *N. parsimon*; anellus with the front edge cone-shaped; aedoeagus fairly long to moderately broad; cingulum longish, narrow; tegumen small with small cheeks; falces moderately long. Bristles on the harpagines moderately strong and numerous at the base, less numerous in the apical area.

Androconia slightly variable, broadly oblong, slightly longer than broad. Evenly and slightly arched distally, more strongly proximally, with twelve fairly closely-placed rows of reticulations.

Neochrysops parsimon Fabricius. Plates XII, fig. 19; XX, fig. 32; XXIX, fig. 32.

Papilio Plebeius ruralis parsimon Fabricius, Syst. Ent., p. 526 (1775); *id. idem* Mantiss Class, vi, p. 77 (1787); *id. idem* Ent. Syst., iii, p. 303 (1793).

Papilio celaeus Cramer, Pap. Exot., iv, p. 177, Pl. 379, figs. *k,k* (1782).

Lycaena celaeus Trimen *var.*, Rhop. Afr. Austr., p. 247 (1866).

Cupido celaeus Aurivillius (*in parte*) Rhop. Athiop., p, 375 (1898).

Catochrysops celaeus Neave, P.Z.S. Lond., p. 58 (1910).

♂. Upperside, both wings brown, decidedly more solid in texture than in *plebeia*, so that the underside pattern does not show through; the only mark visible is an indefinite blackish marginal spot on the

secondaries between veins 2 and 3, with a faint trace of yellow above it. In some very fresh specimens from certain localities the colour approaches very closely to *plebeia*; this may, however, be only due to the very fresh condition of the specimens. Underside, both wings brown or brownish grey with the usual spots, whose white edging is decidedly narrower than in *plebeia*; the spots of the postmedian series are definitely encircled spots adjacent together, but not confluent. Primaries with the usual spot closing the cell; the postmedian series consisting of six spots, the upper four almost in a line, the fifth shifted somewhat inwards, and the sixth sometimes double, vertical below the outer edge of the fifth; a marginal row of internervular dashes, preceded by a row of six sublunular marks edged on each side with white. Secondaries with a black basal spot on the inner margin, four subbasal ones below each other, the central two adjacent, and another black spot further out below the costal vein; the postmedian series composed of six spots, the first oval, the second to the fourth shifted slightly outwards, all being in line and inclined inwards, the fifth shifted inwards, sixth slightly outwards; a marginal row of semilunular marks preceded by a row of sublunular broadish dashes edged on each side with white; a black marginal spot between veins 2 and 3, with blue metallic scales and broad orange internal edging. No tails.

♂. Both wings, upperside, brownish with the whole of the area up to the subterminal brown stripe and up to the costal vein inclined to whitish suffused entirely with sublustrous violet blue, the blue scaling at the base being much denser and so doing away with the whitish appearance. Primaries with a large and prominent spot closing the cell, a broad brown subterminal stripe separated from the terminal broad stripe by internervular pale spots. Secondaries with the blue suffusion up to vein 7 instead of the costal as in the primaries; the subterminal stripe is lunular and the terminal brown-spotted band is somewhat indefinitely edged with whitish.

Expanse, ♂ 44; ♀ 46–52 mm.

Type lost, one female in the Banks collection, British Museum, but not referred to by Fabricius.

Hab. Sierra Leone; Lagos; Angola, Coast of Guinea; Entebbe (*F. J. Jackson*); West Uganda (*Neave*); Nairobi; Victoria Nyanza (Oxford Mus.); N.E. Rhodesia (*A. A. Langshaw*), Kiboriani, Kangwa Kibara (*Trimen*).

There has been so much confusion with this species that it has been necessary to go back over all the old literature traceable.

Fabricius published in 1775 his Systema Entomologiae, and on page 526 described *parsimon* as follows :—

" *Parsimon.* 349. P.P.R. alis integris, fuscis, subtus cinereis, albo undatis; posticis basi punctis ocellaribus nigris, apice ocello.

" Habitat in Sierra Leon Africae. Mus. Banks.

" Major. Antennae albo-annulatae, clava fulva, Alae omnes supra fuscae, immaculatae, subtus cinereae, macula media reniformi fasciisque posticis lunularibus albidis : posticae ad basin punctis quinque atris, annulo albo cinctis et ad angulum ani ocellus-ater, annulo antice rufo, postice aureo cinctus.

" Variat supra alis anticis macula media nigra et posticis lunulis apicis albis maculaque rufa."

In 1787 he (Fabricius) merely catalogues the species in his Mantissa on p. 77, Clas. vi, giving only the first brief description word for word, except that he ends it with " apiceque ocello " instead of " apice ocello " ; but in 1793 (Entomologia Systematica) he repeats his description in full on p. 303, with no further amendments.

From this three points come out prominently : first that the species is without tails, secondly that the upperside is brown, and thirdly that the underside has five black spots at the base of the secondaries. This description was therefore not taken from the female (a very palpable female) in the Banks collection at the British Museum, for that specimen has such a strong and largish suffusion of blue on the upperside that it would have been quite impossible not to notice, whilst it has four basal black spots, not five. This specimen cannot therefore be taken for a type. In 1782, however, Stoll published Vol. iv. of Cramers' Papilio Exotiques, in which he described and figured at p. 177 and Plate 379, figs. *k,k*, his *Papilio celaeus* from the coast of Guinea.

Hitherto *parsimon* has been identified either as a blue or brown insect either with tails or without, and by some authors as mere aberrations of one species. My researches with the genitalia prove, I think, that the tailed and tailless insects are two species, not one, and also that the blue and the brown butterflies are likewise two species not one, and it remains for us to determine which is the insect that Fabricius described. Aurivillius is evidently unable to throw any light on the matter as intimated in his Rhopalocera Aethiopica, so that I am thrown entirely on my own investigations, and I have come to the definite conclusion

that Fabricius and Stoll described the same species, and in this I am glad to follow the lead given by Trimen in both his works (*l.c.*), for though he confused the species and thought that *parsimon* was blue, yet he recognised that the descriptions of the two early authors referred to the same species, which no doubt made him (Trimen) consider, in his earlier work, that the brown species was a variety of the blue, but he never realised that true *parsimon* had no tails. I come therefore to the conclusion that *parsimon* and *celaeus* are brown, and that they have five black spots at the base of the secondaries, and that neither has a tail, and I find that in recently arranged collections the species has been named *celaeus*, though in many the blue and brown have been mixed together. Stoll's name will therefore have to sink to *parsimon* Fabricius, who has seven years priority; therefore the blue species, commonly called *parsimon*, is left without a name, for which I suggest *synchrematiza* (Greek *συνχρηματίζω*, mentioned together with).

Genitalia with harpagines subovate at the base, tapering to a moderately even narrower arm, concave at its lower margin, but curved downwards suddenly near the tip and shortly recurved into a small hook at the apex; the bristles are fine and are not very abundant; anellus bluntly cone-shaped; aedoeagus of moderate length and width; tegumen smallish, very deeply excised, with fair-sized cheeks; falces strong of moderate length.

Androconia slightly variable, but the general shape is somewhat fan-shaped, broader than long, very slightly expanding distally, with the distal edge moderately arched, with eleven rows of reticulations placed fairly closely together vertically.

Neochrysops victoriae Karsch. Plates XII, fig. 20; XX, fig. 33.

Lycaena victoriae Karsch, Ent. Nachr., 21, p. 300 (1895).
Cupido victoriae Aurivillius, Rhop. Ethiop., p. 374 (1898).
Catochrysops acholi Bethune-Baker, Ann. and Mag. N. H., xvii, p. 107 (1906).
Cupido victoriae Druce, Illust. Afr. Lyc., p. 19, Pl. viii, figs. 2, 2*a* (1910).

♂. Upperside, both wings uniform darkish brown, quite markless, with the one exception that in the secondaries between veins 2 and 3 there is a black marginal spot broadly edged internally with deep yellow. No tails. Underside, both wings ashen grey with spots

scarcely darker than the ground, encircled with white. Primaries with a semilunular spot closing the cell; the postmedian series consisting of six spots usually disconnected, second and third spots just touching each other and shifted slightly outwards, fourth spot somewhat inwards, fifth more inwards, sixth vertical below the fifth; a series of submarginal subsagittate internervular marks and a marginal series of internervular dashes each edged with whitish. Secondaries with the usual black spots, one basal one in inner margin, three sub-basal below each other, one costal below vein 8 near its termination; postmedian series consisting of six spots, the first oval, the second to the fourth touching each other and fairly in line, all shifted outwards from the first, fifth shifted inwards, sixth shifted outwards obliquely; a marginal row of four subsagittate spots preceded by a row of sagittate internervular marks edged with white, the inner edging being sagittate; a black marginal spot between veins 2 and 3 with metallic blue scales and broad internal yellow edging.

♀. Upperside, both wings whitish with lustrous blue superimposed scales. Primaries with costa broadly brown, and termen very broadly brown. Secondaries with a postmedian series of spots, varying in size and number; a marginal row of large spots with sagittate white internal edging preceded by a brown subsagittate series of internervular marks; subanal spot as in the male. Underside as in the male, but paler and with broader white edging.

Expanse, ♂ 48; ♀ 48–52 mm.

Hab. British East Africa (Kitoto); Uganda Protectorate (Patigo).

Types: ♀ in the Imperial Zoological Museum, Berlin; ♂ in my collection (4 ♂♂ and 4 ♀♀); other specimens in the British Museum from the Nandi Plateau (*Neave*).

Karsch described the female from Kitoto (Ugowe Bay), and subsequently having a small series of both sexes I described the male from the Acholi country, having failed to recognise the previous description of the female. The species is apparently local and uncommon. The figure represents my ♂ type.

Genitalia with harpagines long, broadish at the base, narrowing rapidly and terminating in a sub-sickle-shaped apex; the whole clasp is covered with long strong bristles, those at the apex being shorter and finer; anellus with the front apex bluntly cone-shaped; aedoeagus broad, of moderate length, raised into a knob near extremity on its upper edge, from whence it is somewhat excised to the tip; vesica very fine with practically no sculpturing; cingulum long and very narrow; tegumen but little excised (this is apparently

variable), with very broad, well-rounded, ample cheeks, with the falces long, strong, and well curved; the cheeks have a fair supply of bristles at the margins.

Androconia absent. This is one of the very few species of the genus that has no androconia.

Neochrysops quassi Karsch. Plates XII, fig. 21; XX, fig. 34; XXIX, fig. 34.

Lycaena quassi Karsch, Ent. Nachr., 21, p. 305 (1895).
Lycaena negus, B. E. Zeit., 38, p, 226 (1893).
Catochrysops phasma Butler, Ann. and Mag. N. H., vii, p. 290 (1901).

♂. Upperside, both wings dull violet with broad blackish posterior margins, the primaries with a blackish dash closing the cell. Secondaries with a deep black spot on the termen between veins 2 and 3, which is edged above with orange. Underside, both wings brownish cream-colour, with darker brown spots and marks edged with white. Primaries with the usual dash closing the cell; a postmedian, almost straight row of seven spots, of which the first below the costa is the smallest; a subterminal row of sublunular marks, followed by the terminal row of broadish internervular dashes; termen finely brown. Secondaries with a black basal spot on the inner margin, followed by three sub-basal black spots with a fourth shifted further out below the costal vein; a pale brown crescent closes the cell; the postmedian row consists of six spots, the first is shifted outwards from and below the fourth black spot, the second further out, the third and fourth slightly inwards, fifth more inwards, the sixth is reniform and is shifted somewhat outwards; a subterminal lunular row of internervular dashes edged internally broadly with white subsagittate marks; a terminal row of spots with the usual subanal black spot, with a fine blue metallic external edge and a broad internal orange edge; termen finely brown. At the extremity of vein 2 is a fine tail.

♀. Upperside, both wings brown, with a lustrous violet blue suffusion over the basal two-thirds of the wings, and a tendency to whitish in the postmedian area. Primaries with a postmedian row of dark spots encircled with white—this character is variable, I have one specimen before me with no spot at all, one with only a trace of them, another with one definite spot, two specimens with two spots, and others up to five, but the complete absence of them is rare—a trace of a subterminal row of largish brown spots edged very finely with white externally but broadly internally. Secondaries with the spot closing the cell and the postmedian curved row of spots which is

apparently always present, the subterminal row consists of lunules, otherwise it is as in the primaries. In other particulars the female is like the male both on its upper- and underside.

Expanse, ♂ 44–46; ♀ 45–48 mm.

Hab. Ashanti; Lagos (B. M.); Agege (*Farquharson*), Oxford Museum.

Type in the Berlin Museum.

Butler compared this species, which he named *phasma*, with both *celaeus* and *patricia;* the genitalia show it to be more nearly related to the former than the latter, whilst the pattern as well as the genitalia show that it is also nearly related to *victoriae*, the pattern of the females having obvious and rather unusual similarities. I should rather liken it to a tailed form of *synchrematiza B-B.*, with which it is in colour and pattern somewhat more similar; the colour of the male upperside is almost exactly alike. The prehensores are, however, different.

Genitalia. Harpagines of moderate length, strongly concave on the lower margin, broader at the base, but gradually diminishing in width until a third from the apex, where it is suddenly excised deeply and terminates in a deepish sickle apex; the whole harpago is generally furnished with a plentiful supply of longish bristles, which at the base are on the lower margin, but are on the upper margin at the apex. Anellus with cone-shaped front edge; aedoeagus not very stout and shortish; cingulum narrow, of a fair length; tegumen merely a narrow collar; cheeks of small dimensions, with the front margin nearly vertical and straight; falces long, decidedly narrow, and terminating in a fine well-curved hook; cheeks with plenty of longish strong bristles.

Androconia somewhat variable, the general form is a long oval which expands slightly distally, which extremity is well and evenly curved; the proximal extremity is somewhat asymmetrically curved, the footstalk being very frequently not central; it is not infrequent for them to assume a shape approaching the spherical when the proximal end is symmetrical and the footstalk central. There are generally twelve rows of reticulations, placed well apart. There are other variations whilst a few scales are narrowly elliptical.

Neochrysops synchrematiza nom. nov. Plates XIV, fig. 1; XX, fig. 35; XXIX, fig. 35.

Lycaena parsimon auctorem (*in parte*).

Cupido parsimon Aurivillius, (?) Rhop. Aethiop., p. 375 (1898).

♂. Upperside, both wings dull violet blue with the nervules showing finely black; cells closed by a fine blackish dash, which broadens after the specimens have flown much; a variable dark subanal marginal spot, sometimes inconspicuous, sometimes prominent. No tails. Undersurface brownish grey, with spots scarcely darker than the ground-colour, edged broadly with white. Primaries with a large irregular spot closing the cell; postmedian series composed of six spots, second and third irregular, fifth shifted inwards slightly obliquely, sixth inclined to be reniform; a submarginal lunulated series with white sagittate inner edging, and a marginal row of six spots. Secondaries with four black spots near the base and one shifted right out above the postmedian series, three below each other and one close to the base on the inner margin; spot closing the cell large; postmedian series composed of six spots, the second shifted well outwards, third inwards, fourth smaller inwards, fifth more inwards, and the sixth shifted outwards; submarginal lunular series edged with white sagittate marks; a marginal row of spots, the subanal one black with a few metallic blue scales on its outer margin and a fair-sized orange spot on its inner edge.

♀. Both wings brown. The primaries suffused with lustrous blue scales over the median and postmedian areas; a trace of a submarginal series of spots. Secondaries with the blue almost confined to the cell, and a distinct marginal row of spots, otherwise like the male.

Expanse, ♂ 42–46; ♀ 50–53 mm.

Hab. Sierra Leone.
Types in my collection.

Genitalia. Harpagines, long narrow arm-like processes, rather wider at the base and slightly tapering towards the apex, concave on the lower margin, slightly convex on the upper margin, apex suddenly excised to form a strong broad hooked termination; the whole arm is plentifully furnished with long strongish bristles; anellus with front margin sub-cone-shaped and slightly asymmetrical; aedoeagus broad, rather short; cingulum long, of slight dimensions, but strengthened by the central portion of each side being somewhat excised, so as to form an internal sort of collar; tegumen raised into a narrow high ridge at the rear, almost wholly excavated, so that the cheeks stand out forwards and are somewhat wedge-shaped; the falces are longish and of moderate dimensions; the cheeks are well supplied with longish bristles.

Androconia moderate size, oblong, with distal apex excurved asymmetrically as a rule, tapering rapidly distally to the somewhat

large footstalk, with twelve rows of reticulations placed well apart, but the vertical reticulations are generally rather close together.

This species is decidedly rare in collections, and it has invariably been called *parsimon*, but, as I have already shown, it is quite impossible for it to be the insect described by Fabricius. I have been unable to trace it from anywhere but Sierra Leone.

Neochrysops solwezii sp. n. Plates XIV, fig. 2; XX, fig. 36; XXIX, fig. 36.

♂. Upperside, both wings brownish lilac with a pink tinge, in some lights dull lilac colour, with the dash closing the cells rather obscure; termen narrowly brown. Secondaries with the subanal spot edged internally with orange. No tails. Underside, both wings whitish grey, with darker spots and markings encircled with white. Primaries with the spot closing the cell subreniform; the postmedian series consisting of six spots, the third oblique, the fifth oblique shifted inwards, sixth largish; the submarginal row of internervular dashes fairly broad, marginal row more definite, inclined to be subhastate. Secondaries with four black spots near the base, three below each other, one shifted inwards on the inner margin, a fifth black spot below vein 8 at a third from the apex; a largish broad indented dash closes the cell; postmedian series composed of six large spots, the third large, ovate, slightly oblique, fourth and fifth shifted inwards, sixth outwards; submarginal row crenulate almost hastate; marginal row of spots inclined to have the spots pointed internally; subanal black marginal spot with metallic blue scales and with a broad internal orange edging, a similar very small spot at the anal angle.

♀. Upperside, both wings brown, with the basal three-quarters to the upper margin of the cell lustrous violet blue. Secondaries with all the underside markings except the black spots showing through. In the primaries the postmedian series shows through indistinctly. Underside primaries with an occasional seventh minute spot below the costa in the postmedian series. Secondaries with an occasional double black spot in the centre of the three.

Expanse, ♂ 51–56; ♀ 47–54 mm.

Hab. Solwezi Mwengwa, N.W. Rhodesia (*H. Dollman*) November and December; Usangu (Tanganyika District), November 1910 (*S. A. Neave*).

Types in the British Museum; co-type in the Oxford Museum and in my collection.

The colour of the male is most difficult to describe; it seems to be a mixture of heliotrope and brown and lilac with a certain admixture of pink; in a bright light it is a delicate and beautiful colour that shows but little of its delicacy on a dull day.

Genitalia. Harpagines very long of the usual ham-shaped base with long very narrow arms, slightly excised on their upper margins before the apex, which is turned up into a strong hook with a dentate edge; the whole harpago is furnished with long strong bristles; anellus large with the front margin highly conical; cingulum strongly built but of narrow dimensions; tegumen merely a narrow ridge, excised as to its front edge, with cheeks of moderate size, somewhat conical in the shape of their lower front apices; falces long and strong with unusually broad basal shoulder pieces; cheeks plentifully supplied with long bristles; aedoeagus long, of but moderate width.

Androconia very variable as between each specimen, large to very large, roundish or ovate to very large oblong; the two East African (Tanganyika District is the new name, I believe) specimens differ from each other, and these differ from the N.W. Rhodesian specimens; the roundish scales have eleven to twelve rows of reticulations placed fairly closely together, with irregular sculpturing; the ovate and oblong ones have generally eleven rows placed well apart horizontally, but vertically the reticulations are moderately close.

Neochrysops glauca Trimen. Plates XIV, fig. 4; XX, fig. 37; XXIX, fig. 37.

Lycaena glauca Trimen, S. Af. Butt., p. 21 (1887).
Cupido glauca Aurivillius, Rhop. Aethiop., p. 375 (1898).
Catochrysops glauca Butler, P.Z.S. Lond., p. 193 (1898).
Catochrysops glauca Neave, P.Z.S. Lond., p. 58 (1910).
Lycaena asteris Wallgr., K. Sv. Vet. Akad. Handl., p. 40 (1857). [" *In parte* " all authors.]

♂. Upperside, both wings delicate pale silvery blue, with the termen somewhat broadly brown. Primaries with a blackish-grey lunule closing the cell, not present in the secondaries, which have a black subanal spot bordered above with orange. Underside, both wings whitish grey, with slightly darker spots edged with white. Primaries with a lunular spot closing the cell, followed by the post-median series of six spots, the second and third slightly irregularly placed, the fifth somewhat oblique and shifted inwards, sixth

vertically below the inner margin of its predecessor; a subterminal row of subsagittate internervular marks and a terminal row (almost a continuous stripe) of broad internervular dashes. Secondaries with four black spots near the base, three below each other, one smaller, shifted well in on the inner margin, and a fifth shifted right out a quarter or less from the apex. A lunular spot closes the cell, followed by the postmedian series of six spots, the first very oblique and ovate, the second to the fourth adjacent somewhat oval, inclined slightly inwards, fifth shifted inwards, sixth slightly outwards; a subterminal row of sharply crenulate internervular marks followed by a row of spots; a subanal black spot with bluish metallic scales and an internal broad orange border with a small similar anal spot. A very fine short tail.

♀. Upperside, both wings brown with the central area of the wing from the base to three-quarters of the wing pale lustrous blue, a large spot closing the cell of the primary only, and a trace of yellow at the tornus of the primary. Secondaries with a submarginal row of lunular marks followed by a row of spots, a considerable development of orange in the anal area above the marginal spots; otherwise like the male.

Expanse, ♂ 44; ♀ 48 mm.

Hab. Transvaal (*Selous*); Mashonaland (*Marshall*).

Types in Joicey collection.

There is no doubt, I think, that two species have again been confused together. There is the blue species described by Trimen, and very accurately described as to colour: "in tint intermediate between the uppersides of *L. corydon* Scop. and *daphnis* W.V." (i. e. *meleager*); he, however, also says with a slight greenish gloss, and it is because of this remark, I think, that the confusion has arisen. I have no doubt that the green and the blue species are distinct; the former is a rather larger and a more robust insect than the latter, whilst it appears to obtain further north and not in the south. Neave (*l.c.*) briefly draws attention to this difference in colour between the South African *glauca* and those found further north. The androconia show decided differences, as will be seen from the descriptions and figures.

Genitalia, with the harpagines somewhat elliptical at the base, tapering gradually into the usual long arm-like sclerite with a shortly spatulate (almost knob-shaped) tip; the bristles are long but not very plenteous; the anellus is subconical at the front margin; the aedoeagus shortish and of medium width; the cingulum is decidedly

narrow; the tegumen is a narrow ridge at the rear; cheeks produced well forwards and wedge-shaped, with fine bristles; falces long, broad at the base, but with the terminal portion narrow.

Androconia somewhat variable, of a long oblong shape, but variable in size, and with a few scales ovate in form, well arched distally, tapering off rapidly proximally to the attachment stalk; ten or eleven rows of reticulations placed somewhat closely together vertically.

The figure is taken from one of Trimen's specimens (Joicey coll.) from the Transvaal.

Neochrysops chloauges sp. n. (*χλο-αυγής*, with a greenish lustre). Plates XIV, fig. 3; XXI, fig. 38; XXIX, fig. 38.

Catochrysops glauca Neave, P.Z.S. Lond., p. 58 (1910).

♂. Upperside, both wings very pale lustrous yellowish green with the termen narrowly brown. The green is of a very delicate hue, almost indescribable in words, with a peculiar iridescent lustre that changes according to the angle of light on its surface. Primaries with a dark grey bar closing the cell. Secondaries with a subanal black marginal spot with a yellow internal border. From the end of vein 2 there is a fine tail. Underside, both wings stone grey with darker marks broadly edged with white. Primaries with the usual spot closing the cell, followed by the postmedian series consisting generally of seven spots, the first minute (sometimes absent) below the costa, fourth spot oblique, largish, fracturing the series internally and externally, sixth shifted inwards, seventh a twin spot or subreniform; a series of sagittate submarginal internervular marks, marginal row of spots confluent, inclined to lose its spotted character. Secondaries with four black spots near the base, three below each other and one shifted well towards the base on the inner margin, a fifth black spot below vein 8 at a third from the apex; a large spot closes the cell; the postmedian series consists of six spots, the first isolated and oval, second, third and fourth adjacent shifted well outwards, fifth shifted inwards, sixth slightly outwards; submarginal internervular series of marks lunular rather than sagittate; terminal row of definite spots; the subanal black spot with greenish metallic scales on its outer margin and a broad internal edging of orange.

♀. With the basal median and postmedian areas whitish suffused with lustrous bluish-green scales; costal and terminal margins broadly brown, but in the secondaries the termen is spotted with brown; otherwise as in the male.

Expanse, ♂ 45–46; ♀ 46–48 mm.

Hab. N.E. and N.W. Rhodesia.

Type in my collection.

This is the species referred to under *C. glauca* Trimen, that has always been regarded as a variety of that species; I have no doubt that they are distinct. The present species, apart from its colour, which is not caused in relaxing, is more robust; the primaries are decidedly broader and the secondaries more ample than in Trimen's insect. The genitalia differ slightly, whilst the androconia can be separated at a glance.

Genitalia with the harpagines very long, narrow and highly arched; base unusually narrow, somewhat ham-shaped, very slightly excised near apex, which terminates in a spatulate, broad, short hook; base well furnished with long curved bristles, which are much less plentiful towards the apex; anellus with the front margin but slightly curved; aedoeagus longer and narrower than usual; tegumen merely a very narrow collar, with small cheeks which have long narrow falces; cheeks with long bristles.

Androconia somewhat pyriform, the expansion distally being gradual but marked; distal apex broad and well arched; proximal apex quite narrow; footstalk strong, tapering; eleven rows of reticulations lying moderately close to each other. The difference in shape between this and *glauca* is observable at once.

Neochrysops polydialecta sp. n. (πολίς διάλεκτος, much discussion). Plates XIV, fig. 5; XXI, fig. 39; XXIX, fig. 39.

♂. Upperside, both wings pale violet blue with a lilac tinge; cells closed by a fine dark dash; termen narrowly black. Secondaries with a black subanal spot with a trace of a few metallic scales and an orange internal border, the latter often absent. No tails. Underside, both wings whitish grey with pale brown markings edged with white. Primaries with the dash closing the cell narrow; the postmedian series short, consisting of five small spots whose white margins touch, third spot oblique, fifth spot isolated shifted inwards; a broadish submarginal row of internervular marks, followed by a narrow terminal row. Secondaries with four black spots near the base, three below each other, one shifted well basewards on the inner margin, a fifth black spot beyond the centre of vein 8 just below it; the usual sublunular mark closing the cell; the postmedian row consisting of six spots, the first slightly ovate and slightly oblique, second shifted well outwards, third somewhat

oblique, fifth shifted inwards, sixth outwards; a submarginal row of narrow internervular lunules, the upper two of which are shifted well inwards and are diffused; a terminal row of smallish half spots; the black subanal spot with bright blue metallic scales with a broad orange internal edging and a trace of a smaller one at the anal angle.

♀. Upperside, both wings with the basal two-thirds to three-quarters up to vein 6 whitish with a strong suffusion of violet blue; costa and termen broadly brown, with a trace of whitish dashes separating the submarginal brown border from the marginal border. Underside like the male, except that in the primaries the postmedian series consists of six spots.

Expanse, ♂ 42; ♀ 44–45 mm.

Hab. Kadugli, Nuba Mountains, May, August and September (*R. S. Wilson*); Ullal, July, all in the Oxford Museum; and Gulu-Gulu, Kibwezi (*F. J. Jackson*).

Types in the Oxford Museum.

This is a species that has given Professor Poulton and me more trouble than any of the group, whether it was *negus* Felder, or a paler tailless form of *parsimon* auctorem, it was most difficult to determine, and we came to the conclusion that the latter was probably the best solution of the difficulty; it proves, however, on examination of the genitalia and the androconia to be without any doubt a distinct species.

Genitalia. Harpagines longish, ham-shaped at the base, tapering into a moderately long arm-like organ, with a short, strongly hooked apex well supplied with long strong bristles for all its length; anellus with the front edge curved; aedoeagus of moderate length and width; cingulum long, but of slight proportions; tegumen raised into a very narrow ridge at the extreme rear; cheeks projected well forwards, of but moderate dimensions, with well-curved front margins which are well supplied with long bristles; falces very long and curved highly near the base.

Androconia variable, of two sizes; one being of a long oblong shape with the distal extremity very slightly curved, and the proximal tapering rapidly off into the long footstalk, and the other much shorter, almost quadrate; these latter are much the more numerous; the sculpturing on both is the same, there being twelve rows of reticulations, not very close to each other, with the reticulations far apart vertically. There is one very interesting aberration which appears to be an ill-developed androconia; it is most unusually large, and

instead of having rows of reticulations it has fifteen rows of fine ribbing, something between the ribbing of the ordinary scale and the reticulations of the androconia.

Neochrysops aethiopia sp. n. Plates XIV, fig. 9; XXI, fig. 40; XXIX, fig. 40.

♂. Upperside, both wings pale bluish violet with a tinge of lilac. Primaries with a deep black dash closing the cell, and broadish dark termen. Secondaries with a linear black termen preceded by a row of terminal spots, the subanal spot being deep black with orange internal edging which extends into the angle; there is a fine tail from vein 2. Underside, both wings very pale whitish grey with pale brown markings broadly edged with white. Primaries with the usual spot closing the cell; the postmedian series consisting of six spots nearly vertical, the third spot slightly oblique, the fifth and sixth shifted slightly inwards; there is also a trace of a minute spot below the costa; the submarginal series consisting of five almost confluent subhastate internervular marks, together with a sixth that is shifted somewhat inwards, a terminal somewhat similar stripe with its outer margin straight (not hastate). Secondaries with four black spots near the base, three below each other well separated, and one near the base on the inner margin; a fifth black spot below vein 8, at a third from the apex; a fair-sized dash closes the cell, followed by the postmedian series consisting of six spots, the first isolated and oblique, the second to the fourth touching each other and inclined inwards in a slight curve, the bottom one of the curve shifted inwards, the sixth spot shifted outwards; the internervular marks composing the submarginal row are conical in shape; a terminal row of four spots followed by the subanal black spot with blue metallic scales and an internal orange edging, of which there is a small trace in the anal angle itself.

♀. Upperside, both wings brown with the basal three-fifths suffused with violet-blue scales up to the middle of the cell; otherwise as in the male.

Expanse, ♂ and ♀ 50 mm.

Hab. ♂♂ Portuguese East Africa (Kola Valley and Mt. Chiperone), 1700 to 2500 feet (*Neave*); Boma District, East Africa; ♀ near Weenen, Natal, 2500 feet (*Marshall*).

Type ♂ in the National Collection (five specimens), ♀ in the Hope Collection, Oxford.

The dates of capture of the four specimens are respectively,

November 19 and 21, 1913; the Boma specimen, January to March 1915, and the Natal one, November 10, 1896.

This species is allied to *N. patricia* Trimen, but the colour above and the pattern below are different, whilst it is also a much larger insect.

Genitalia. Harpagines long and narrow, tapering somewhat rapidly from a wider base, lower margin concave, upper margin convex, surface shagreened towards the apex, which forms a spatulate hook, numerous bristles along the whole length; anellus with the front margin conical; aedoeagus longish and narrowish; cingulum of moderate dimensions; tegumen a mere ridge at the rear, but rather wider than usual, with smallish cheeks produced forwards with long strong falces; cheeks with a good supply of fine bristles.

Androconia of a long oblong shape with a longish footstalk; distally the curve is broad and even, proximally it tapers off towards the attachment stalk; there are ten rows of reticulations placed rather closely together.

Neochrysops nyasae sp. n. Plate XIV, fig. 10.

♀. Upperside, both wings brown with the basal five-sixths up to the upper margin of the cell sparingly suffused with pale blue scales; the postmedian area inclined to be whitish. Primaries with a large irregular spot closing the cell, beyond which is a disconnected row of small dots encircled with white, the spot on the fold being larger. Secondaries with the spot closing the cell obscure, being the spot on the undersurface showing through; a trace of a postmedian row of spots; a terminal row of largish spots edged with white, and an internal lunular dark edging beyond; a subanal black spot with slight metallic scaling and an internal edging of orange; a fine tail from vein 2. Underside, both wings whitish with dark brown spots encircled with pure white. Primaries with a good-sized spot closing the cell; the postmedian series consisting of seven spots, all largish except the one directly below the costa, which is placed inwards, spots one to five are in a slight curve, the fourth spot being more or less oblique, spots six to seven are shifted inwards; the submarginal row consists of subhastate marks, and the marginal row consists of subhastate *spots*, more or less confluent. Secondaries with five black spots near the base, four below each other and one on the inner margin, a sixth black spot is shifted out beyond the middle below vein 8; a good-sized spot closes the cell and is followed by the postmedian series of six spots, the first being oblique and isolated, spots two to four are in a curve, the fifth is shifted

inwards and the sixth, subreniform, is shifted outwards; the submarginal stripe is lunular and is more definite than usual; the marginal row of spots is very broadly edged with white; the subanal black spot has metallic blue scales and is edged internally with orange, there being a minute repetition of this in the angle.

Expanse, ♀ 48–54 mm.

Hab. NYASALAND, Mlanje and near Lake Chilwa (*Neave*); both taken in January.

Type in the British Museum. Two specimens.

I was at first unable to satisfy myself whether or not this was a dimorphic form of the female of the preceding species *aethiopia*, but the unusually marked and strongly contrasted underside, coupled with more knowledge of the variation of the genus, makes me sure that it is the female to a new species whose male has yet to be discovered; but under any circumstances the form is so well marked and so unusual on its underside that it well deserves to be named.

Neochrysops patricia Trimen. Plates XIV, fig. 7; XXI, fig. 42; XXIX, fig. 42.

Lycaena patricia Trimen, S. Afr. Butt., ii, p. 20 (1887).
L. asteris (*in parte*) Wallgr., Rhop. Caffr., p. 40 (1857).
L. celaeus (*in parte*) Trimen, Rhop. Afr. Austr., p. 247 (1866).
L. parsimon Wallgr., Öfvers. Vet. Akad. Forhandl., 3, 1. p. 88 (1875).
Catochrysops patricia Butler, P.Z.S. Lond., p. 192 (1898); *id.* Neave, P.Z.S. Lond., p. 58 (1910).
Cupido patricia Aurivillius, Rhop. Aethiop. p., 374 (1898).

♂. Upperside, both wings pale violet colour with narrow brown margins. Primaries with a narrowish dash closing the cell. Secondaries with a subanal black spot edged internally with orange, and a fine tail from vein 2. Underside, both wings pale brownish grey with somewhat darker spots edged with white. Primaries with the spot closing the cell; the postmedian series of six spots has the upper four in a slight curve, whilst the fifth and sixth spots are shifted inwards; the submarginal row of internervular marks is broad and more or less confluent; the terminal stripe is a series of more or less confluent spots. Secondaries with four black spots near the base, three below each other and one nearer the base on the inner margin, a fifth black spot is beyond the middle below vein 8; an oval spot closes the cell; the postmedian series is com-

posed of six spots, the first isolated, the second to the fifth somewhat confluent in a curve with the fifth shifted well inwards, the sixth spot shifted outwards; the submarginal stripe consisting of lunules; the terminal row is spotted, with a subanal black spot having blue metallic scales and an internal edging of orange colour.

♀. Upperside, both wings brown with the basal two-thirds suffused with bright blue scales; the blue area in the secondaries is more restricted, otherwise as in the male.

Expanse, ♂ 40–46; ♀ 44–54 mm.

Hab. Cape Colony; Kaffirland; Natal; Zululand; Transvaal; Mashuna; Somaliland; Northern Rhodesia; Kibwezi (*Jackson*); Abyssinia (British Museum).

Types in the Joicey collection.

Genitalia. Harpagines long, broadish at the base, tapering very rapidly into the usual narrow arm-like process, with the lower margin concave and the upper convex, terminating in a spatulate apex that is somewhat dentate; there are longish bristles for the whole length, in some specimens few, and in others very numerous; anellus with the front edge curved; aedoeagus of moderate length and width; cingulum rather narrow; tegumen a narrowish ridge at the rear with small cheeks less projected forward than usual, with long, strong falces; cheeks with a good-supply of bristles.

Androconia variable. The typical series in the Joicey collection have them oblong in shape, distally with a very slight curve, proximally very similar, but tapering off slightly to the attachment stalk; seven or eight rows of reticulations placed well apart, whose sculpturing is definite and well apart also.

In other specimens that are quite inseparable superficially, the androconia are rounder and broader, with twelve rows of reticulations placed closely together, whose sculpturing is also close.

I have thought it advisable to figure Trimen's type again so as to present to the student the distinctions between it and its near allies.

Neochrysops carsoni Butler. Plates XIV, fig. 6; XXI, fig. 43; XXX, fig. 43.

Catochrysops carsoni Butler, Ann. and Mag. N. H., Seventh Series, 1901, p. 290.

♂. Both wings violet blue with the termen rather broadly brown; the primaries have the cell closed with a brown dash; the secondaries

have two largish anal yellow spots, the inner one with an internal black terminal spot; a short tail at the end of vein 2. Underside, both wings dull brownish grey, rather darker in the secondaries with brown spots encircled with white. Primaries with the usual spot at the end of the cell; the postmedian row consisting of four spots below each other followed by two spots shifted well inwards; a submarginal row of broadish internervular dashes followed by a terminal row of spots. Secondaries with four subbasal white-ringed black spots, with a fifth halfway along the costa, below which is the dash closing the cell; the postmedian series consists of four spots in a deep curve, the uppermost being isolated, and the lowermost being followed by two spots shifted well inwards that lie below each other; a submarginal series of narrow lunules broadly edged with white internally; a marginal series of spots broadly edged with white internally; two anal orange spots with two black spots on their external edge, the anal one being a small twin one, a little metallic scaling on the larger black spot.

Expanse, 38 mm.

Hab. Fwambo.

Type, unique, in the British Museum.

I admit this with some doubt; *patricia* is a variable species, especially as to the form of the postmedian series of spots, and this insect seems to me to be an aberration of Trimen's species, but as the type is unique it is not possible to decide the question definitely; but the androconia are certainly different, whilst the genitalia are also slighter in general build.

Neochrysops negus Felder. Plates XIV, fig. 12; XXII, fig. 44; XXX, fig. 44.

Lycaena negus Felder, Reise Nov. Lep., p. 279, Pl. 35, figs. 1 and 2 (1865); *id.* Trimen S. Afr. Butt., ii, p. 21 note (1887); *id.* Karsch, Ent. Nachr., xxi, p. 299 (1895); *Cupido negus* Aurivillius, Rhop. Aethiop., 373 (1898).

♂. Upperside, both wings pale violet sublustrous blue with dark marks closing the cells. Primaries with a row of more or less semispherical internervular terminal brown spots preceded by a submarginal series of internervular brown lunules. Secondaries with similar terminal and submarginal pattern to that in the primaries, but more pronounced; a subanal black marginal spot with orange internal edging. Underside, both wings greyish white with

pale brownish spots and markings edged with white. Primaries with the usual spot closing the cell, narrowish and sublunular; the postmedian series is composed of five or six spots, the first to the fourth spots more or less erect, the third spot generally oblique, the fifth shifted inwards, the sixth, when present, is immediately below it; the terminal row of internervular dashes is practically confluent and is preceded by a broad confluent row of submarginal sublunular marks. Secondaries with four black spots near the base, three below each other and one on the inner margin nearer the base, a fifth black spot is shifted outwards below vein 8, above the curved dash closing the cell; the postmedian series is composed of six spots, the first isolated and oblique, the second to the fifth adjacent and placed in a curve so strong as to bring the fifth spot almost below that closing the cell, sixth spot reniform, shifted somewhat outwards; the terminal row of almost semispherical spots is preceded by a definite series of confluent lunules from the apex to the anal angle; the subanal marginal spot is black with metallic blue scales edged internally with chrome yellow.

♀. Upperside, both wings brownish with a slight irroration of blue scales from the basal to the median areas; the cells are closed by a brown spot. Primaries with a confluent brown broad terminal stripe, with fine pale internal line separating it from the submarginal row of broad internervular dashes. Secondaries with a terminal row of subspherical spots preceded by a row of internervular lunules, a large black subanal spot with chrome yellow internal edging. Underside precisely as in the male. This species is not tailed.

Expanse, ♂ 40; ♀ 42–45 mm.

Hab. Bogos Hansal; Nairobi; Kuju River.

Type in the Tring Museum.

The identity of this species has for long remained uncertain; it is evidently very rare in collections. The type is a female, and it is without tails. I fortunately possess a male that I have little doubt is the male of the Tring species, and my figures of the genitalia and androconia are from this specimen.

Genitalia with the harpagines very long, widish at the base, the lower margin tapering gradually into a narrow arm highly concave on the lower margin, nearly straight on the upper margin, suddenly bent downwards at a fifth from the apex, which is spatulate and recurved upwards into a short hook; the bristles along the whole length are long and fairly plentiful; anellus with the front edge cone-shaped; aedoeagus shortish, very slightly curved; anellus slightly

hollowed at the extremity; cingulum very long and narrow; tegumen a narrowish ridge at the rear, with cheeks projecting well forwards, sub-wedge-shaped, with very long falces highly hooked at the tips; the bristles on the cheeks rather fine and moderately numerous.

The genitalia as a whole are very large for the size of the insect.

Androconia very variable indeed, from a short oval shape or a long oval through an oblong of various sizes to a quadrangular form either short or long, with nine rows of reticulations, rarely ten, whose sculpturing is placed fairly far apart horizontally and decidedly so vertically.

Neochrysops neonegus sp. n. Plates XIV, fig. 8; XXII, fig. 45; XXX, fig. 45.

♂. Upperside, both wings sublustrous pale blue, iridescent, pale violet at one angle of light, almost silvery at another, with very narrow brown borders. Primaries with a good-sized spot closing the cell. Secondaries with a black subanal spot edged internally with orange colour, which latter extends slightly into the anal area. A fine tail from vein 2. Underside, both wings whitish grey with brown spots edged with white. Primaries with a spot closing the cell, and the postmedian series consisting of seven spots, the first very small between the costa and vein 7, the second to the fifth in a slight curve, the third and fourth spots being placed somewhat obliquely to each other, the sixth spot shifted a little inwards, and the seventh just below it; the submarginal row is composed of six almost reniform internervular broadish dashes; the terminal row is composed of almost oval narrow dashes. Secondaries with five black spots near the base, four below each other, the two central ones close together, the fifth nearer the base on the inner margin; a good-sized black spot is placed far outwards below vein 8. A large spot closes the cell; the postmedian series is irregular and is composed of six largish elongated spots, the first oval and oblique, the second oblong shifted outwards, the third also oblong, larger, shifted inwards, fourth slightly wedge-shaped shifted inwards, fifth oblong shifted well inwards, the sixth subreniform shifted slightly outwards; the termen has a row of spots in a white area which is edged internally by a series of internervular lunules, beyond which to the postmedian row the ground-colour is almost entirely white; a subanal black spot with bright metallic scales, edged internally with an orange-chrome lunule that extends somewhat into the anal area.

♀. Upperside, both wings brownish, with the basal four-fifths pale

lustrous blue; a series of four small postmedian spots that are larger in the secondaries and are inclined to be obsolescent (I have one specimen in which all these spots are absent). In the secondaries the terminal area is whitish with a terminal row of brown spots. Underside like the male, but with the pattern accentuated.

Expanse, ♂ 38–40; ♀ 42–44 mm.

Hab. Nairobi District, February, May and June; Laitokitok (*Jackson*), May.

Types in my collection. A long series.

N. negus Felder has no tails: I regard this species as the tailed form of that insect, though the pattern below is much larger and not exactly similar; the two species are nevertheless nearly allied. The great majority of my specimens have five black spots below in the basal area of the secondaries; a few have only four, as in *negus*, but otherwise the pattern is like the species just described.

Genitalia. Harpagines very long and narrow, wider at the base, tapering slowly into a long narrow arm-like process with a shortly spatulate extremity [in the type specimen the extremities are asymmetrical, the one apex ending in a point, the other being spatulate; this asymmetry is frequent, almost totalling to 50% of the specimens mounted. I have dissected eighteen examples, but several had the apices broken off, so it is difficult to give the exact percentage]; the bristles are long and fine; the anellus has a roughly cone-shaped front margin; the aedoeagus is narrow and moderately long; the cingulum is of moderate length and rather narrow; the tegumen being merely a narrow raised ridge at the rear of the cheeks, which are of small dimensions, being almost wedge-shaped and projected well forward, with longish fine bristles and long falces of moderate width terminating in a short strong hooked apex.

Androconia variable, oblong to roundish, attachment stalk long, placed centrally, oblong scales with the distal extremity on a very slight curve, roundish scales well curved distally; proximally the oblong scales are slightly truncate, but the round ones keep their rotundity; nine to ten rows of reticulations placed fairly closely, the sculpturing vertically being moderately close also.

Neochrysops variegata sp. n. Plates XII, fig. 8; XXII, fig. 46; XXX, fig. 46.

♂. Upperside, both wings sublustrous violet blue. Primaries: termen rather narrowly brown, a largish spot closes the cell. Secondaries with the termen narrowly brown, a subterminal row of spots

showing through from the underside, as also does the curved dash at the end of the cell. A fine tail from vein 2. Underside, both wings whitish grey, with darker brownish-grey spots edged with white. Primaries whiter than the secondaries; largish spot closes the cell; the postmedian series of spots having the upper four spots in a slight arc, the third spot being often irregular, fifth and sixth spot shifted inwards; a terminal row of subelliptical spots, preceded by a row of six internervular dashes, the apical three being lunular. Secondaries with four black spots in the basal area, the fourth one very small, shifted well basewards on the inner margin; the black spot in the cell is sometimes a double spot; another black spot is on vein 8 above and beyond the hastate spot closing the cell; the postmedian series is composed of six spots, the first isolated oval and somewhat oblique, the four following spots in a strong curve inclined inwards, the fifth being shifted well inwards, sixth spot shifted outwards, a row of marginal spots edged internally by a row of lunules, between which and the postmedian series is a row of almost hastate, broad white marks; a subanal black spot with bright metallic green scales and edged inwardly with orange.

♀ Upperside, both wings brownish becoming paler exteriorly, with a sparse irroration of sublustrous blue scales over the lower parts of the wings, inclined to be whitish in the postmedian areas. Primaries with the addition of a postmedian series of five spots, which are liable to radiation.

Expanse, ♂ and ♀ 34 to 39 mm.

Hab. Nairobi District, 6000 feet; Tongido, 4500 feet, February, May and June.

Types in my collection.

Genitalia. Harpagines very long and very narrow, especially so considering the small size of the species; the base wider, though narrow, tapering fairly rapidly into the usual long arm-like process terminating in a subspatulate apex, really being more a short heavy slightly hooked extremity than spatulate; the bristles are not numerous, they are long and fairly stout; anellus cone-shaped; aedoeagus shortish and of moderate width; cingulum long and narrow; tegumen a very narrow well-raised ridge at the rear of the cheeks, which are more quadrate, with a waived front margin; the bristles are very fine and longish, with the falces long and rather narrow; terminating as usual in a fine slight hook.

Androconia almost round with nine rows of reticulations placed widely apart, the sculpturing being also widely apart vertically; the sculpturing is rather small.

Neochrysops nevilli, sp. n. Plates XII, fig. 9; XXII, fig. 47; XXX, fig. 47.

♂. Upperside, both wings a peculiar greyish lilac with an unusual leaden lustre, the cells closed by a narrow dash. Secondaries with a subanal black spot internally edged with orange. No tails. Underside, both wings dull pale grey with spots scarcely different from the ground-colour, but edged broadly with white. Primaries with the cell closed by a spot; the postmedian series composed of six spots, the upper four in a slight curve, the third placed obliquely, the fifth shifted inwards with the smaller sixth below it; a subterminal row of almost confluent subtriangular internervular dashes, followed almost directly by the row of terminal spots. Secondaries without the usual black spots in the basal area, except that there is a minute one in the middle of the inner margin; a very small black spot is below vein 8 near the middle of the costa; a subtriangular dash closes the cell; the postmedian series is composed of six smallish spots, the upper five in a good curve, the third spot being placed obliquely, and the fifth shifted well inwards, thus making the strong curve, the sixth spot is shifted outwards; a subterminal row of triangular dashes followed by the terminal row of subtriangular spots; a black subanal spot with metallic blue scales internally edged with chrome yellow.

♀. Upperside, both wings bright lustrous violet blue, with the cells closed by the usual spot. Primaries with costa and termen broadly dark brown, secondaries with a postmedian series of five spots, beyond which the ground-colour is inclined to be whitish; a subterminal row of subtriangular dashes, followed by a terminal row of smallish spots; otherwise like the male. Underside like the male, only all the spots are larger and more of the basal black spots are present though very small, the basal one below vein 8 and the two on the inner margin are present, the one in the cell is little more than indicated.

Expanse, ♂ 38; ♀ 39 mm.

Hab. Hope Fountain, S. Rhodesia.

Types in my collection.

This is a peculiar and pretty little species captured by my friend, the Rev. Neville Jones, to whom I have dedicated it. It should be readily identified when found, but the type pair are the only specimens I have yet come across, and I am very grateful to my friend for his kind gift of them.

Genitalia. Harpagines very long, especially so considering the size of the species, with base broadly ovate, tapering rapidly into the long arm-like sclerite, suddenly excised near the apex into a flattened sickle-shaped extremity, which is sharply serrate; the bristles are long and fairly numerous; anellus with a broadly cone-shaped front margin; aedoeagus moderately long and broadish; cingulum broad; tegumen narrowly ridge-shaped, with rather small cheeks having fine curved bristles and very long fine falces.

Androconia oval, moderately large, generally tapering wider distally so as to be almost fan-shaped, eleven rows of reticulations whose vertical sculpturing is fairly close together.

Neochrysops naidina Butler.

Catochrysops naidina Butler, P.Z.S. Lond. p. 762, Pl. 47, fig. 2 (1885).

♂. Upperside, both wings pale silvery French grey blue with narrow brown margins; an indistinct anal spot to the posteriors. Underside, pale clear stone grey with dark spots encircled with white. Primaries with a blackish spot closing the cell; the postmedian series of blackish spots consisting of the upper four in a slight even curve, the third being oblique, the fifth spot shifted inwards, the sixth rather outwards; two indefinite marginal rows of dashes, the inner one being sublunular. Secondaries with five black subbasal spots, four somewhat below each other and the fifth, on the costa, seeming to form the first spot of the postmedian series, including which this series consists of seven spots, the six lower ones being liver brown in colour, the second to the fifth spots form an irregular curve, the second and fourth of these are obliquely placed, the sixth spot is shifted inwards, and the seventh very slightly outwards; the spot closing the cell is liver brown; a submarginal row of pale brown spots in a white area edged inwardly with a lunular brown stripe, which is edged internally with a more or less sagittate white area; two black anal spots, the lower one small, and indefinitely edged above with orange and with iridescent scales.

Hab. Somaliland.
Type in the British Museum (unique).
This is a very distinct little species.

Neochrysops procera Trimen. Plates XXII, fig. 48; XXX, fig. 48.

Lycaena procera Trimen, Trans. Ent. Soc. Lond., p. 125, Plate. 8, figs 3 and 4 (1893).

Cupido procerus Aurivillius, Rhop. Aethiop., p. 374 (1898).
Catochrysops procera Butler, P.Z.S. Lond., p. 842 (1897).
Catochrysops procerus Neave, P.Z.S. Lond., p. 57 (1910).

♂. Upperside, both wings dull violet blue with broadish brown borders. Primaries with a dark lunule at the end of the cell. Secondaries with a trace of a terminal row of spots. No tails. Underside, both wings clear ash grey with slightly darker spots sharply edged with whitish. Primaries with the cell closed by a lunule; the postmedian series composed of five smallish spots with a dot below the fifth, the five spots are irregular in a slight curve with the third placed obliquely; an ill-defined subterminal series of internervular lunules followed by a similar terminal series of oval spots. Secondaries with four black spots near the base, three below each other and one on the inner margin near the base, a fifth black spot below the costa above the lunule closing the cell; post-median series composed of six spots, the first isolated, the second to the fifth in a slight curve inclined basewards, sixth shifted outwards; a subterminal row of defined internervular lunules preceded by short sagittate white marks and followed by a row of terminal spots; a subbasal small black spot with metallic scales and a faint yellow internal edging.

Expanse, 20 mm.

Hab. Natal.
Type in the Joicey collection.
The female of this species appears to be unknown.

Genitalia. Harpagines of the long arm-shaped formation, the base being very little wider than the rest of the harpago, which is decidedly wider than usual and is somewhat uneven in outline, at a third from the tip it rapidly tapers down narrowly into a bluntly pointed curved apex; bristles very long and fairly strong along the whole length; anellus produced forward in an irregular front edge; aedoeagus of a fair length, not very broad; cingulum long and of moderate dimensions; tegumen narrowly ridge-shaped with cheeks bluntly wedge-shaped produced well forwards with plenty of bristles; falces long, broad at the base, highly curved.

Androconia very large, of a long oblong shape with a slight depression in the centre of the distal edge, tapering off proximally into the attachment stalk, which is long, with thirteen rows of reticulations whose sculpturing is small and rather far apart vertically.

Neochrysops hypopolia Trimen. Plates XIV, fig. 11; XXIII, fig. 49; XXX, fig. 49.

Lycaena hypopolia Trimen, S. Afr. Butt., ii, p. 30 (1887).
Cupido hypopolia Aurivilleus, Rhop. Aethiop., p. 373 (1898).

♂. Upperside, both wings of a peculiar dull plumbeous violet with a broadish brown termen, cell closed by a faint dark dash in the primaries only. Secondaries with a subanal yellow spot pupilled with black. Underside, both wings whitish grey with pale brown marks edged with whitish. Primaries with a spot closing the cell; postmedian series consisting of five spots very evenly placed in a slight curve; a trace of a subterminal internervular row of marks, followed by a much fainter trace of a terminal row. Secondaries with four minute black spots near the base, the fourth shifted inwards on the margin; the cell is closed by a fair-sized dash; the postmedian series consisting of six spots, the first isolated below, but shifted outwards from, a small black spot below the costa, the second and third large, shifted outwards, forming with the smaller fourth and fifth a series inclined sharply inwards, sixth shifted outwards; a subterminal row of lunular (almost crenulate) internervular marks, followed by a faint trace of terminal small spots; a minute black subanal spot with metallic scales and edged inwardly with yellow.

Expanse, 45–48 mm.

Hab. Natal; Transvaal; Mashonaland, Umtali, (*Dobbie*) [B. M.].

Types in the Joicey collection.

There are specimens from the Transvaal in the Joicey collection that Trimen himself refers to that are brown below with the spots of the same colour, but encircled with white; I have no doubt they are the same species, but they are not as fresh as the type, and it may well be that the whitish scales have rubbed off, as they have every appearance in the type specimen of being rather loosely superimposed scales.

Genitalia. Harpagines of the long arm-like type, with the base but little wider, tapering gradually towards the apex, which is excised into a broad strong-hooked extremity; the whole length is plentifully supplied with strong bristles; anellus broadly cone-shaped, aedoeagus short and broad; cingulum long and very narrow; tegumen a narrowish ridge with lobe-shaped cheeks projecting well forwards, having fine bristles, with the falces long and broadish at the base.

Androconia variable from oval to oblong, all highly arched distally; a fair number of the scales being unusually long, all of which are straight laterally, with ten rows of reticulations placed well apart, whose sculpturing is placed vertically very close together.

Euchrysops Butler.

Euchrysops Butler, Entomologist, 33, p. 1 (1900); *id.* Swinhoe, Lep. Ind., p. 40 (1910); *id.* Rothschild, Nov. Zool., 22, p. 137 (1915).

Catochrysops Boisduval, Voy. Astrol. Lep. i, p. 87 (1832); *id.* Moore, Lep. Cey., p. 90 (1881); *id.* Distant, Rhop. Malay., p. 223 (1884); *id.* de Nicéville, Butt. Ind., iii, p. 175 (1890); *id.* Bingham, Fauna Brit. Ind. Butt., ii, p. 410 (1907); *id.* Seitz, Gross. Schm. Erde, i, p. 292 (1909).

For detailed synonymy see under *Euchrysops cnejus.*

Neuration. Primaries, cell half the length of the wing, vein 1 waived terminating almost in the tornus, vein 2 commencing from beyond the middle of the cell, 3 from well behind the lower angle, 4 from the lower angle, 5 from the middle of the discocellulars, 6 from the upper angle, 7 from well behind the angle, 8 stalked from 7 shortly in front of the costa, 9 absent, 10 and 11 from the cell, the latter from about the middle thereof, 12 waived reaching the costa a little before the middle. Secondaries, with cell not half the length of the wing, fairly broad, vein 1*b* longish, 1*a* to above the tornus, vein 2 long commencing before the middle of the cell, 3 from well behind the lower angle, 4 from the lower angle, 5 from the middle of the discocellulars, 6 from the upper angle, 7 from near the centre of the cell, 8 long. A short fine tail from the end of vein 2. Eyes glabrous in the type, hairy in *E. barkeri.* Antennae with a longish club, deeply grooved. Palpi upturned, not exactly porrect, second segment long roughly scaled, third segment slender slightly scaled. Legs slender and short.

Type, *Euchrysops cnejus* Fabricius.

Euchrysops cnejus Fabricius. Plates XXIII, fig. 50; XXX, fig. 50.

Hesperia cnejus Fabricius, Ent. Syst. Suppl., p. 430 (1798).
Polyommatus cnejus Godart, Enc. Méth., ix, p. 657 (1823).
Lycaena cnejus Horsfield, Cat. Lep. E.T.C., p. 83 (1829).
Lycaena pandia Kollar,Hügels Kaschmir, iv, pt. 2 (1848).

Lycaena patala, *id.* l.c., p. 419 (1848).
Lycaena cnejus Moore, P.Z.S. Lond., p. 773 (1865); *id.* Herrich-Schäffer, Ex. Schm., ii, fig. 120 ♀ (1869).
Lycaena samoa Herrich-Schäffer, Stett. Ent. Zeit, xxx, p. 37 and 138, Pl. iv, fig. 180 (1869).
Lampides cnejus Butler, Cat. Fab. Lep. B.M., p. 165 (1869).
Cupido cnejus Druce, P.Z.S. Lond., p. 348 (1873).
Lampides patala Butler, Trans. Linn. Soc. Lond., Zool. Second Series, i, p. 547 (1877).
Lampides cnejus Semper, J. Mus. Godef. xiv, p. 158 (1879).
Catochrysops cnejus Moore, Lep. Cey., p. 92 (1881); *id.* Butler, P.Z.S. Lond., p. 605 (1881); *id.* Moore, P.Z.S. Lond., p. 246 (1882); *id.* Doherty, J.A.S.B., lvi, p. 62 (1882).
Catochrysops patala Butler, P.Z.S. Lond., p. 148 (1883).
Catochrysops cnejus Distant, Rhop. Malay., p. 225 (1884).
Catochrysops patala Swinhoe, P.Z.S. Lond., p. 131 (1885); *id. idem*, p. 426 (1886).
Catochrysops cnejus Semper, Schm. Philip, i, p. 185 (1886).
Catochrysops cneius Doherty, J.A.S.B., lv, p. 133 (1886).
Catochrysops cnejus Distant, Rhop Malay., p. 456 (1886); *id.* de Nicéville, Butt. Ind., iii, p. 177 (1890); *id* Grose Smith, Nov. Zool. i, p. 578 (1894); *id.* Leech, Butt. China, ii, p. 335 (1894); *id.* Doherty J.A.S.B., lxvi, p. 181 (1897); *id.* Watson, J.A.S.B., lxvi, p. 608 (1897); *id.* de Nicéville, *l.c.*, p. 698 (1897); *id.* Bingham, Fauna. Brit. Ind. Butt., ii, p. 411 and p. 415 (1907); *id.* Kershaw, Butt. Hongkong, p. 74 (1907); *id.* Lefroy, Ind. Ins. Life, p. 427 (1909); *id.* Pagenstecher, Geog. Ver. Schmett, p. 248 (1909); *id.* Seitz, Gros. Schm. Erde, i, p. 292 (1909); *id.* Swinhoe, Lep. Ind., viii, p. 40 (1910); *id.* Vrehmeyer, Phil. J. Sc. Vol. V.D., p. 69 (1910); *id.* Green, Mem. Dep. Agr. Ind. Ent., Ser. V, No. 1, (1913); *id.* Waterhouse and Lyell, Butl. Austr., p. 100 (1914); *id.* Fletcher, S. Ind. Ins. etc., p. 414, Pl. 26 (1914).
Euchrysops cnejus Butler, Entomologist, xxxiii, p. 1 (1900).

Description.

♂. Upperside, both wings pale lilac violet with narrowish brown termen. Secondaries with an anal and subanal black spot, edged internally with yellow in some specimens but not in others. Underside, both wings pale clear whitish grey with darker spots edged with white. Primaries with a narrow dash closing the cell; the post-

median series composed of six narrowly oval spots, almost erect in line, the lowest spot sometimes absent; the submarginal row of six internervular lunules is followed by a terminal similar row of dashes, which is often indistinct. Secondaries with four small black spots near the base, three below each other and one nearer the base on the inner margin, a fifth black spot just below the costa beyond the middle; the postmedian series is composed of six spots, the first almost isolated, the second to the fifth shifted slightly outwards in an irregular curve inclined inwards, sixth spot subreniform and shifted slightly outwards; a subterminal row of well-marked internervular lunules preceded by white sagittate marks and succeeded by a row of defined terminal spots; two black anal spots with metallic scales and edged internally with yellow.

♀. Upperside, both wings brown covered with silvery-blue scales for the basal three-quarters up to the upper margin of the cell; the secondaries with a row of terminal spots.

Expanse, ♂ 33–35; ♀ 32–38 mm.

Hab. India; Ceylon; Burma; Malay Peninsula; Nias; Andaman; Nicobar Islands; Sumatra; Java; Borneo; Celebes; Philippines; China; Australia; New Guinea; South Sea Islands.

Genitalia. Harpagines longish arm-like processes, the basal half of a long subovate shape, tapering more narrowly in the centre and then expanding to the apex, so as to form a sort of spatulate jaw, deeply excised at the tip into a broad hook toothed on the inner upper margin; the bristles are at the base confined to the lower margin and are numerous, long and strong, in the apical area they are not so confined; anellus weakly developed, with the front margin broadly cone-shaped; aedoeagus shortish, of moderate width; cingulum narrow at the base, expanding decidedly as it approaches the cheeks of the tegumen; tegumen ridge-shaped with lobed-shaped cheeks not produced far forward with fair-sized bristles; falces long and of moderate dimensions.

Androconia, roughly pomegranate-shaped, but without a central depression, with twelve to fourteen rows of reticulations whose sculpturing is generally close together.

Euchrysops suffusus Rothschild.

Euchrysops suffusus Rothschild, Nov. Zool., 22, p. 137 (1915).

Differs from *cnejus* only in that the markings are inclined to obsolescence and that the underside is paler.

It is no doubt a local race of *E. cnejus*.

Hab. Bali.
Type in the Tring Museum.

Euchrysops luzonica Röber. Plate XXIII, fig. 50*a*.

Plebeius luzonicus Röber, Gesellsch. Iris i, p. 60, Pl. v, fig. 22 (1886).

I have not seen this species, and the description is so short that (with species so difficult to separate as these are) I am unable to give any opinion about it.

Hab. Luzon (Philippine Islands).

Euchrysops barkeri Trimen. Plates XXIII, fig. 51; XXX, fig. 51.

Lycaena barkeri Trimen, Trans. Ent. Soc. Lond., p. 129, Pl. 8, figs. 5, 6 (1893).
Lycaena osiris ♀ Trimen (*nec* Hopf.), S. Afr. Butt., ii, p. 15 (1887).
Lycaena asteris Snellen, Tijd. v. Ent., ii, 7, p. 18, Pl. 1, figs. 4, 5 (1872).
Lycaena tiressa Karsch, Ent. Nachn., 21, p. 298, note 55 (1895).
Catochrysops barkeri Butler, P.Z.S. Lond., p. 192 (1898).
Catochrysops barkeri Neave, P.Z.S. Lond., p. 57 (1910).

♂. Upperside, both wings pale lilaceous violet (with less pink in than is the case with *E. cnejus*), with the termen dark and rather broad. Primaries with the cell closed by a fine dash. Secondaries with a subanal black spot always edged with bright orange. A fair-sized tail from the end of vein 2. Underside, both wings pale stone grey with pale brownish markings edged with white. Primaries with a narrow dash closing the cell; the postmedian series composed of six spots, quite irregular so that no spot is in a line with its neighbour, the third to the sixth are very generally oblique, the fifth and sixth being each shifted inwards; the subterminal row of internervular dashes is moderately broad and is followed by the terminal row of more or less oval dashes. Secondaries with three subbasal small black spots below each other, a small black spot nearer the base on the inner margin is often absent, a fifth black spot is situated below the costa well beyond the middle, a curved dash closes the cell; the postmedian series is composed of six spots, the first oblique and narrowly ovate, the second and third shifted outwards, the fourth is small and shifted inwards, the fifth well inwards, the sixth angled and shifted slightly outwards; a row of subterminal lunules

followed by a terminal row of spots, of which the subanal one is black with metallic scales, and a broad internal orange lunule, some orange being also present in the angle itself.

♀. Upperside, both wings brownish grey with the basal two-thirds irrorated with lustrous azure-blue scales, less prominent in the secondaries, in which there is a row of dark subterminal lunules with whitish sagittate inner edging, and followed by a terminal row of dark spots; otherwise like the male.

Expanse, ♂. 34–36; ♀ 36–40 mm.

Hab. Natal; Zululand; Transvaal; Swaziland; Rhodesia; Eastern Equatorial Africa; Congo; Sierra Leone; (*Coll. Bethune-Baker*) Angola (*Coll. B.-B. and Kenrick*).

Type in the Joicey collection.

I have a fair series from Angola, and they are of a decidedly greyer shade of colour than those from the eastern and southern localities.

Genitalia. Harpagines very long and very narrow, the base being rather wider than the long arm and tapering down rapidly, the apical extremity for a fifth slightly reduced in width and very slightly excavated, terminating in a fair-sized knob; a plentiful supply of bristles at the apical end, reducing rapidly in number towards the middle, where they almost cease; anellus hood-shaped, very weakly developed; aedoeagus narrow, very long and simple, with a small vesica well shagreened and armed with fine teeth; this is the only instance where the vesica shows any armature, ordinarily it is of the simplest possible structure; cingulum angled near the base, of moderate length and dimensions; tegumen ridge-shaped, with smallish cheeks having fine bristles; falces short (for the genus) and thick.

Androconia very broad, pomegranate-shaped, but raised in the centre distally (not depressed), with a strong broad attachment stalk, there are fourteen to fifteen rows of reticulations placed moderately well apart, whose sculpturing is close together.

Euchrysops dolorosa Trimen. Plates XXIII, figs. 52 and 52*a*; XXXI, fig. 52.

Lycaena dolorosa Trimen. S. Afr. Butt., p. 41 (1887).
Catochrysops dolorosa Butler, P.Z.S. Lond., 1897, p. 843.
Cupido dolorosus Aurivillius, Rhop. Aethiop., p. 373 (1898).
Lycaena dolerosa Trimen (*in parte*), p. 76, Pl. 5, fig. 13 ♂ (*nec* 13*a* ♀), 1906.
Catochrysops dolerosus Neave, P.Z.S. Lond., p. 57 (1910).

♂. Upperside, both wings very dull violaceous with somewhat narrow brown borders. Secondaries with a black subanal spot and a trace of a terminal row of spots. Underside warm brown with very slightly darker spots somewhat palely encircled. Primaries with a spot closing the cell; the postmedian series composed of six spots not fractured, the upper four in a slight curve, the third being placed obliquely, the fifth and sixth below each other and shifted somewhat inwards; a faint trace of a subterminal series of internervular dashes and of a terminal row of spots. Secondaries with four brown (not black) inconspicuous spots near the base, three below each other and one nearer the base on the inner margin, a darker one beyond the centre of the costa below vein 8; a curved spot closes the cell; the postmedian series is composed of six spots, the first almost isolated, the second shifted well outwards and forming, with the third, fourth and fifth, each of which is shifted inwards, a row of spots inclined strongly basewards, sixth spot shifted outwards, an inconspicuous row of terminal spots with the faintest trace of sagittate slightly paler internal edging, a subanal black spot with metallic-blue scales. No tails.

♀. Upperside, both wings brown with a central patch of violaceous blue scales; otherwise precisely like the male.

These descriptions are taken from the specimens from Natal that are marked "type" in Trimen's writing. They are the dullest and most obscure of the whole group. The colour of the male, however, in other localities is much brighter violet blue, but the underside is unmistakable. In Trimen's plate referred to above the artist has emphasised the whole of the markings, and especially the white edges, much too strongly; I have seen no Natal specimen with such definite markings. Trimen, in our Transactions, *l.c.*, refers to his figure of the female as a variety that he received from Mr. Feltham from Delagoa Bay; this figure is not, however, *dolorosa*, but is, I have no doubt, my *subpallida* major.

Expanse, ♂ and ♀, 30–32 mm.

Hab. Natal; Transvaal (*Crawshay*), in the Brit. Mus.; Usangu Region, Tanganyika District (*Neave*).

Types in the Joicey collection.

Genitalia. Harpagines rather broad (more so at the base), tapering slowly to beyond the middle, where there is a sudden deep curve downwards, from whence they taper very rapidly into a bold sickle-shaped apex; a fair supply of long bristles for most of the

length; anellus bluntly cone-shaped; aedoeagus of but moderate length and width; cingulum angled in the middle and bent well forwards; tegumen a high narrow ridge-shaped collar, with lobe-shaped cheeks with plenty of bristles; falces moderate length and width.

Androconia broadly ovate, tapering somewhat proximally to the attachment stalk, with ten rows of well-marked reticulations placed vertically close together.

Euchrysops subpallida, sp. n. Plates XII, fig. 15; XXIV, fig. 53; XXXI, fig. 53.

♂. Upperside, both wings pale violet colour with broadish brown borders to the primaries, and in the secondaries with linear borders, but with a somewhat indefinite marginal row of spots, and with a subanal black spot. Underside, both wings pale stone grey with decidedly darker spots sharply encircled with white. The arrangement of spots is so similar to that of *mauensis* that it would be difficult to differentiate it, except that in the postmedian series of the primaries spots two and three are placed at an angle to each other, thus interrupting the even curve. The subterminal row of internervular dashes is decidedly narrower and more definite, and in the secondaries the basal spots are black. No tails.

♀. Upperside, both wings brown, with the basal and median areas brightish violet blue; otherwise like the male.

Expanse, ♂ 29–31; ♀ 30–32 mm.

Hab. Sagalla, B.E.A. (*St. Aubyn Rogers*); Nyujoro and Nairobi (*F. J. Jackson*); Tongido (*H. C. Tytler*); Fort Jamieson, Rhodesia; Hope Fountain, Bulawayo (*Neville Jones*).

Types in my collection.

I have found it very difficult to decide whether we have two closely allied species or not in *mauensis* and this insect. The look of the underside is quite distinctive; *mauensis* is obscure and dark in its pattern below, whilst this is pale and very definite. I have a long series of this latter, and they seem to be readily separated from my other species.

Again, the scales of *mauensis* are very broad and squarish in shape, but the scales of *subpallida* are very variable indeed, variable in the specimen itself and more variable when comparing the specimens among each other.

Taking all the points into consideration, I think it is

advisable to treat them as two species, more especially as the genitalia differ also.

Genitalia. Harpagines short, with the base broad from where it gradually tapers to the middle, where it is suddenly depressed at almost right angles and rapidly tapers to a fine apex, which is turned into a short somewhat sickle-shaped termination; fine bristles occupy most of the length; anellus smallish with a curved front edge; aedoeagus longish, somewhat narrow; cingulum bent forward in the middle; tegumen a high collar-like ridge rather wider than in *mauensis*, with small lobe-shaped cheeks that have long strong falces.

Androconia of a longish oblong shape, well arched distally and tapering off but little proximally, with nine to twelve rows of reticulations moderately separated horizontally and rather closely approximated vertically. In different specimens the androconia are often of different lengths and may be so even from the same wing; the difference, however, except for length, is more apparent than real.

Euchrysops subpallida major, var. nov.

♂. Upperside, both wings of a richer tone of violet than in *subpallida*, much larger in size. Underside with the ground-colour warmer in tone than in *subpallida*, with the encircling cream-colour not white; whilst in the secondaries the area between the subterminal and the postmedian series is not white but merely a row of subsagittate white marks, so that the whole underside looks much less white.

♀. Upperside, both wings brown with the basal and median areas violet blue.

Expanse, ♂ and ♀ 34–36 mm.

Hab. Nairobi district, Laitokitok, Kbwezi, N.W. Rhodesia; Bedega.

Type in my collection.

In the Transactions of the Ent. Soc. London for 1906 at p. 76 Trimen refers to what he considers to be a female variety of *dolorosa*, which he figures on Pl. v, fig. 13*a*. This is without doubt a female of this form. I have put this down as a large form of *subpallida* from its close resemblance superficially; the androconia, however, are very different to typical *subpallida*, these being a very long oblong shape, but in the race major they are much shorter

and approach very nearly to some of the more variable examples of the previous species, whilst the genitalia are also similar to it.

Androconia : pyriform, rather small and short, with twelve rows of reticulations, closely approximated vertically. The scales vary somewhat in each specimen and also on the same specimens, some almost approach the smaller scales in *subpallida*, but I have seen no pyriform scales in true *subpallida ;* the insects are, however, so close superficially that it seems better to treat them as races rather than species.

Euchrysops mauensis, sp. n. Plates XII, fig. 13; XXIV, fig. 54; XXXI, fig. 54.

♂. Upperside, both wings violet blue with narrowish brown borders. Secondaries with a black subanal spot with narrow orange internal edge; a row of distinct terminal dark spots. Underside, both wings brownish grey with darker spots having whitish edges. Primaries with a spot closing the cell; the postmedian series composed of six roundish spots, the upper four in an even curve, the fifth shifted inwards, the sixth inclined obliquely outwards; a subterminal row of broadish internervular dashes, increasing in width towards the anal angle; a terminal row of small spots. Secondaries with four small dark spots at the base as usual, a fifth dark spot in the middle of the costa below vein 8; a spot closes the cell; postmedian series composed of six spots, the second shifted outwards, the third, fourth and fifth each inwards, sixth outwards; a terminal row of spots preceded by a subterminal row of brown lunules, between which and the postmedian series the ground is whitish; a deep black subanal spot with metallic blue scales and an internal orange lunule.

♀ Upperside, both wings brown with the basal and median areas violet. Secondaries with the terminal row accentuated; otherwise as in the male.

Expanse, ♂ 30; ♀ 31 mm.

Hab. The Mau Escarpment, B.E.A.
Type in my collection.

Genitalia. Harpagines short, broad for the basal two-thirds, but slightly wider at the base, at a third from the apex suddenly excised into a deep sickle-shaped termination, with long strong bristles in the central and upper portion of the harpago; anellus small and of slight dimensions; aedoeagus rather long considering the size of

the insect, and of but moderate width; cingulum angled in the middle, of moderate dimensions; tegumen merely a very highly-raised very narrow-ridged half collar, with small wedge-shaped cheeks which have long strong falces; cheeks with plenty of long bristles.

Androconia of a short squarish broadly oblong shape, almost straight distally, often with a slight central depression, with twelve or thirteen rows of heavily accentuated reticulations somewhat closely approximated horizontally and very closely vertically.

Euchrysops albistriatus Capronnier. Plates XII, fig. 12; XXIV, fig. 55; XXXI, fig. 55.

Lycaena albistriatus Capronnier, Bull. Ent. Soc. Belg., 33, p. 121 (1889).
Cupido albistriatus Aurivillius, Rhop. Æthiop., p. 373, Pl. 6, fig. 4 (1898).
Catochrysops albistriatus Neave, P.Z.S. Lond., p. 57 (1910).

♂. Upperside, both wings pale lavender blue with very broad brown borders. Primaries with a dash closing the cell. Secondaries with a black subanal spot edged internally by orange, and with a trace of a terminal row of dark spots. Underside, both wings pale stone grey with somewhat darker markings edged sharply with white. Primaries with a spot closing the cell; postmedian series composed of an unbroken row of six spots, the four upper spots in a slight curve, the two lower slightly oblique; a subterminal row of broadish internervular dashes, and a terminal row of oval spots. Secondaries with the usual four basal black spots which are small, and a fifth small black spot almost at the apex of the wing; the cell is closed by a curved spot; the postmedian series of six spots is unusually even, the second spot is shifted somewhat outwards, the third to the fifth each slightly inwards, and the sixth slightly outwards; a subterminal row of internervular lunules edged broadly with subsagittate white marks; a terminal row of small spots; a black subanal spot with broad orange internal edging. No tails.

Expanse, 32–34 mm.

Hab. Congo; Sierra Leone (*Skinner*); Uganda (*Neave*). Type in the Brussels Museum.

Genitalia. Harpagines short, broadish at the base, somewhat ham-shaped, tapering rapidly to a fine point at the apex, which is well turned upwards; the lower edge is concave and the upper slightly convex longish bristles occupy the basal two-thirds; anellus

of slight dimensions; aedoeagus very short and rather broad; cingulum short of moderate width; tegumen a very narrow high ridge tapering rapidly into the well-developed cheeks, which have fine bristles; the falces are of moderate length.

Androconia: pomegranate-shaped with long attachment stalks, with thirteen rows of reticulations placed moderately apart, whose sculpturing is deep and placed fairly close together vertically.

Euchrysops katangae, sp. n. Plates XII, fig. 11; XXIV, figs. 56 and 56*a*; XXXI, figs. 56 and 56*a*.

♂. Upperside, both wings dull violaceous. Primaries with a broad dash closing the cells, and with very broad dark brown well-defined borders. Secondaries with a black subanal spot surrounded copiously with orange, a trace of a terminal spotted border. Underside, both wings warm ash grey with darker spots definitely encircled with white. Primaries with a spot closing the cell; the postmedian series almost erect, the upper three spots in a very slight curve, the fourth slightly oblique and so slightly shifted inwards, fifth more oblique, sixth oblique again and smaller; a row of subterminal internervular dashes, followed by a terminal similar row of narrow oval spots. Secondaries with the usual four black spots near the base, and a fifth one beyond the middle just below vein 8. Cell closed by an angled spot; postmedian series of six spots scarcely fractured, the second spot is shifted somewhat outwards, third, fourth and fifth each slightly inwards, sixth slightly outwards; a subterminal row of small lunules edged by a row of small white sagittate marks and followed by the terminal row of spots, a black subanal spot almost surrounded by a large orange patch.

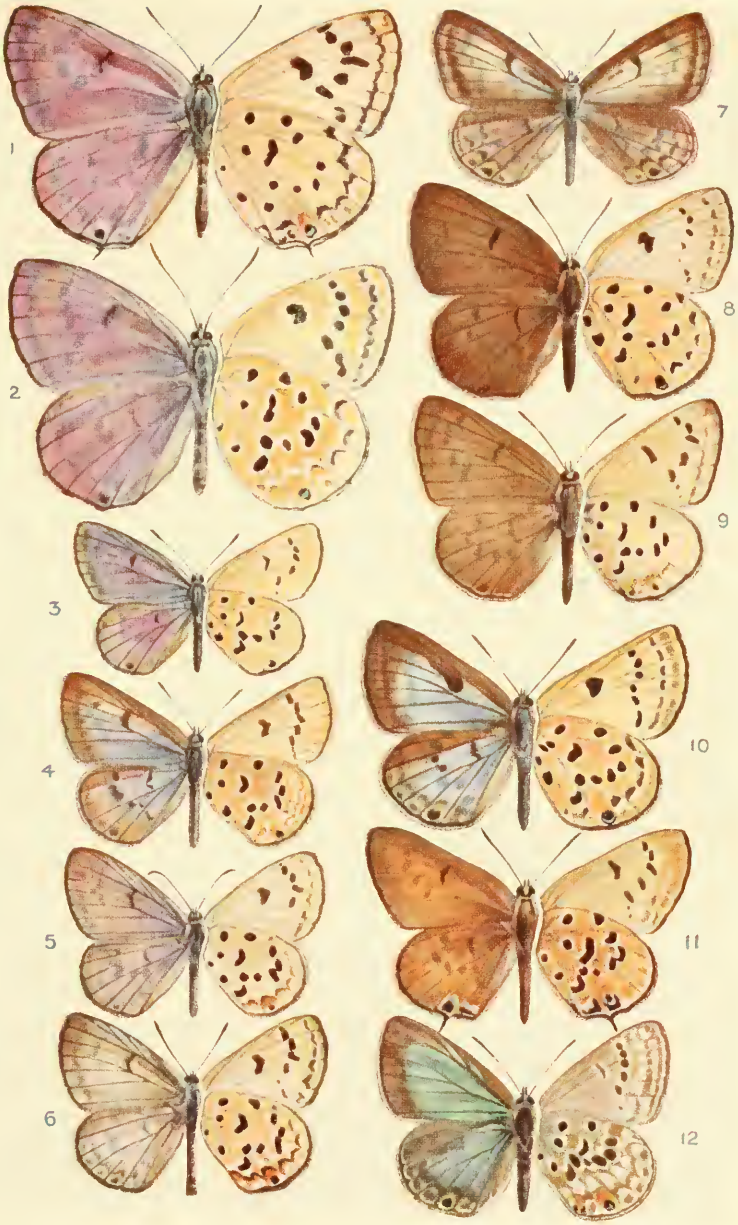
♀. Upperside, both wings with the basal two-thirds whitish tinged with blue to about the middle of the cell. Underside with the ground-colour browner and the spots larger and rounder; otherwise like the male.

Expanse, ♂ 35; ♀ 38 mm.

Hab. Kambove (*Neave*).
Types in the British Museum.

Genitalia. Harpagines short and broad, the basal two-thirds almost wedge-shaped; from the base the harpago tapers rapidly above and below to about two-thirds, where it is suddenly upturned and tapers more rapidly into a strong sharp hooked apex; a fair supply of long strong bristles; anellus of rather small dimensions; aedoeagus short and very broad; cingulum of very moderate length,

FORMS OF NEOCHRYSOPS AND EUCHRYSOPS.

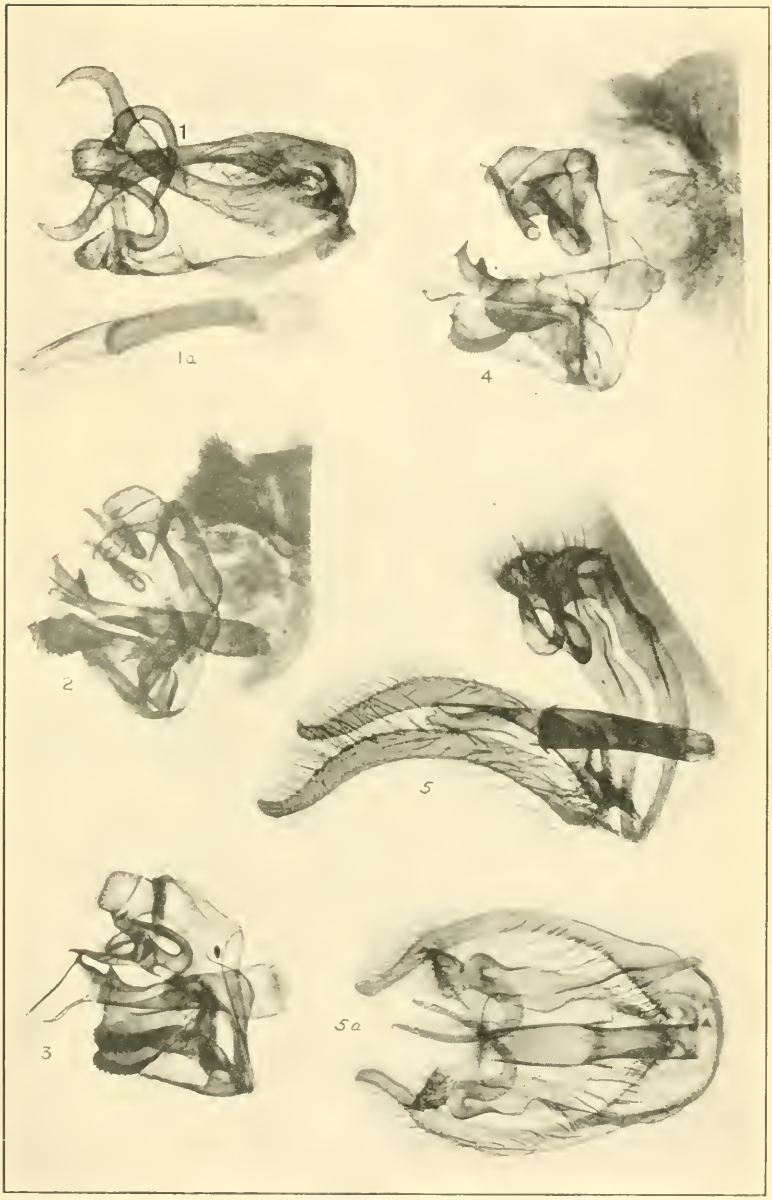


Vaus & Crampton.

FORMS OF NEOCHRYSOPS

Vaughn & Crampton

FORMS OF NEOCHRYSOPS.

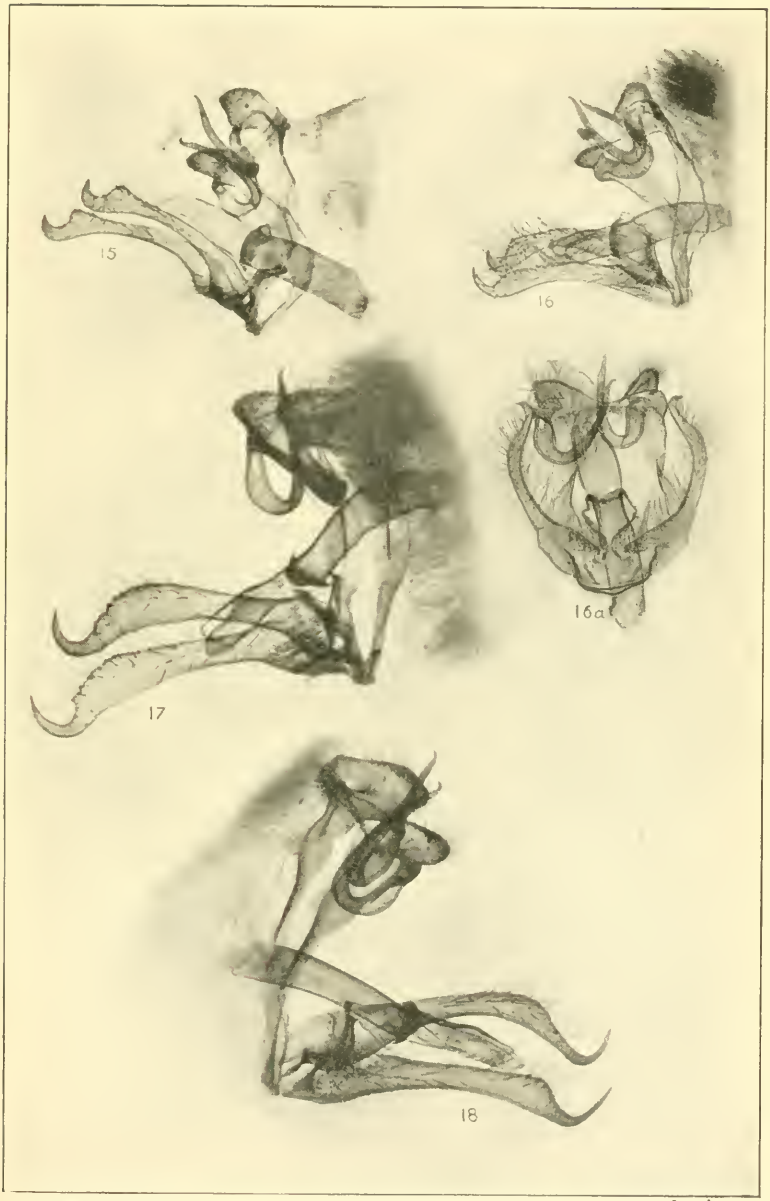


Vaus & Crampton *Fowler, imp.*

GENITALIA OF NEOCHRYSOPS

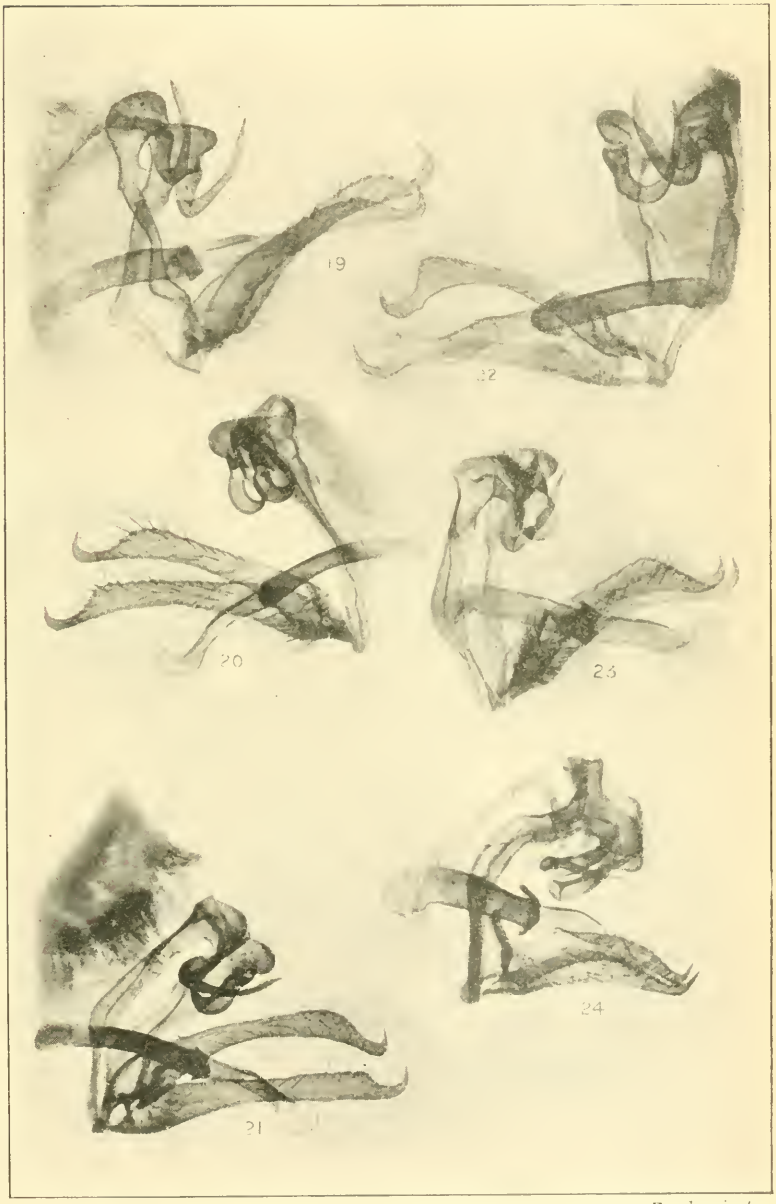
Vaus & Crampton *Fowler, imp.*

GENITALIA OF NEOCHRYSOPS



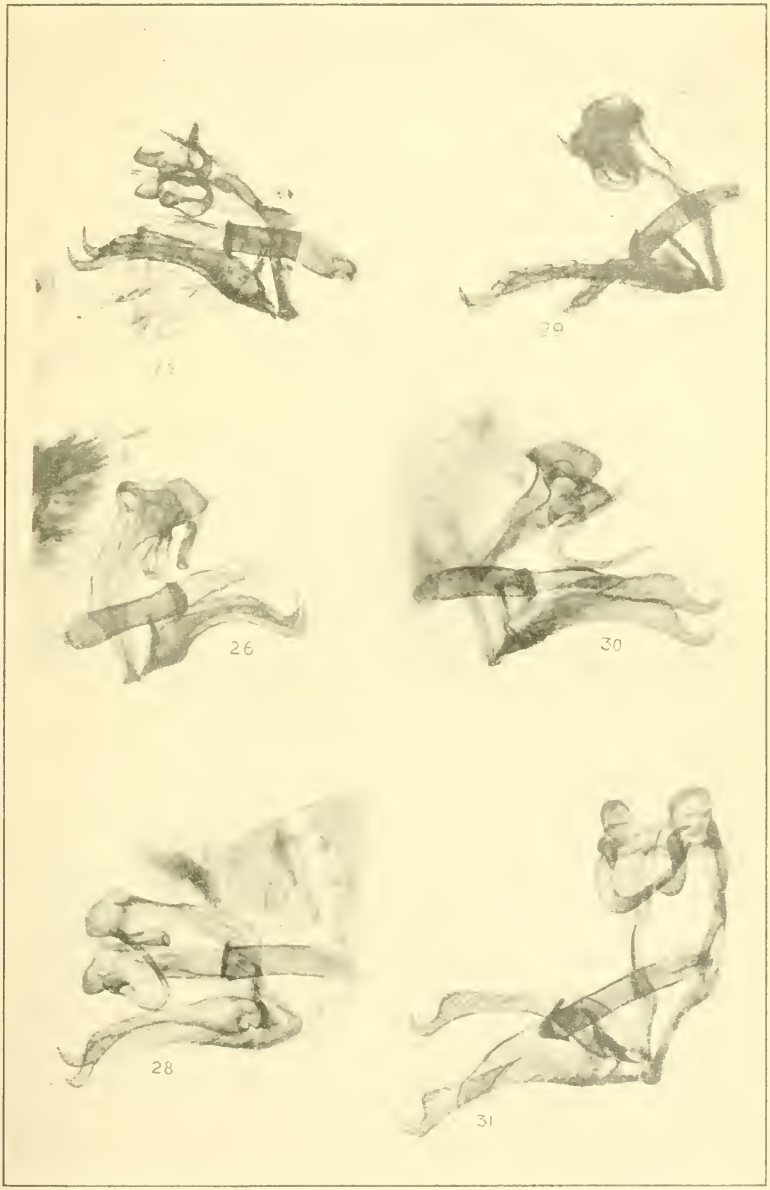
Vaus & Crampton *Fowler, imp.*

GENITALIA OF NEOCHRYSOPS



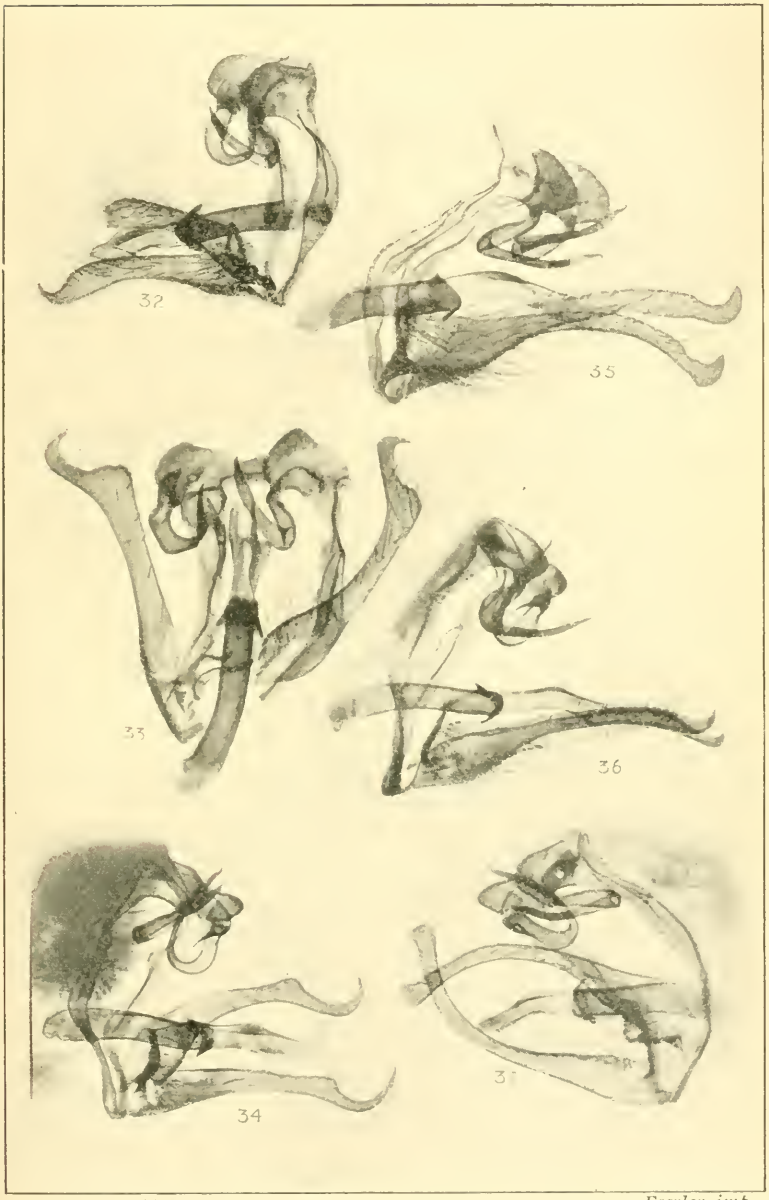
Vaus & Crampton *Fowler, imp.*

GENITALIA OF NEOCHRYSOPS



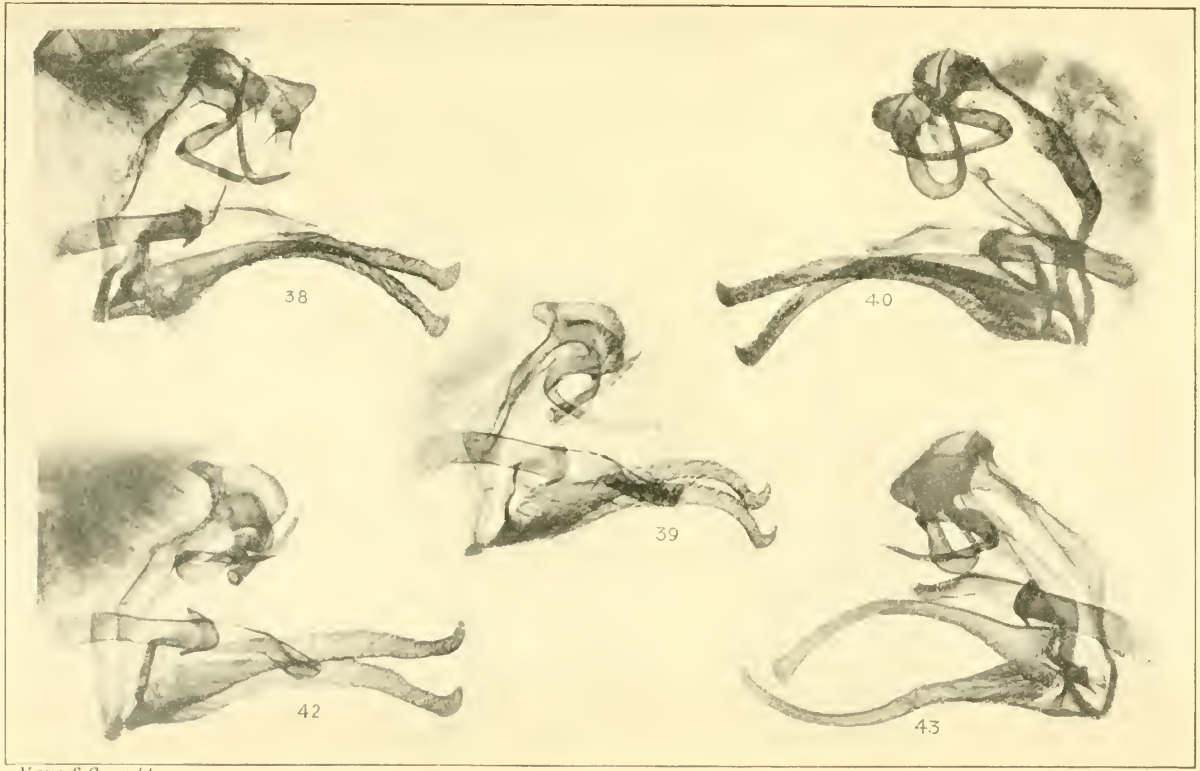
Vaus & Crampton *Fowler, imp.*

GENITALIA OF NEOCHRYSOPS



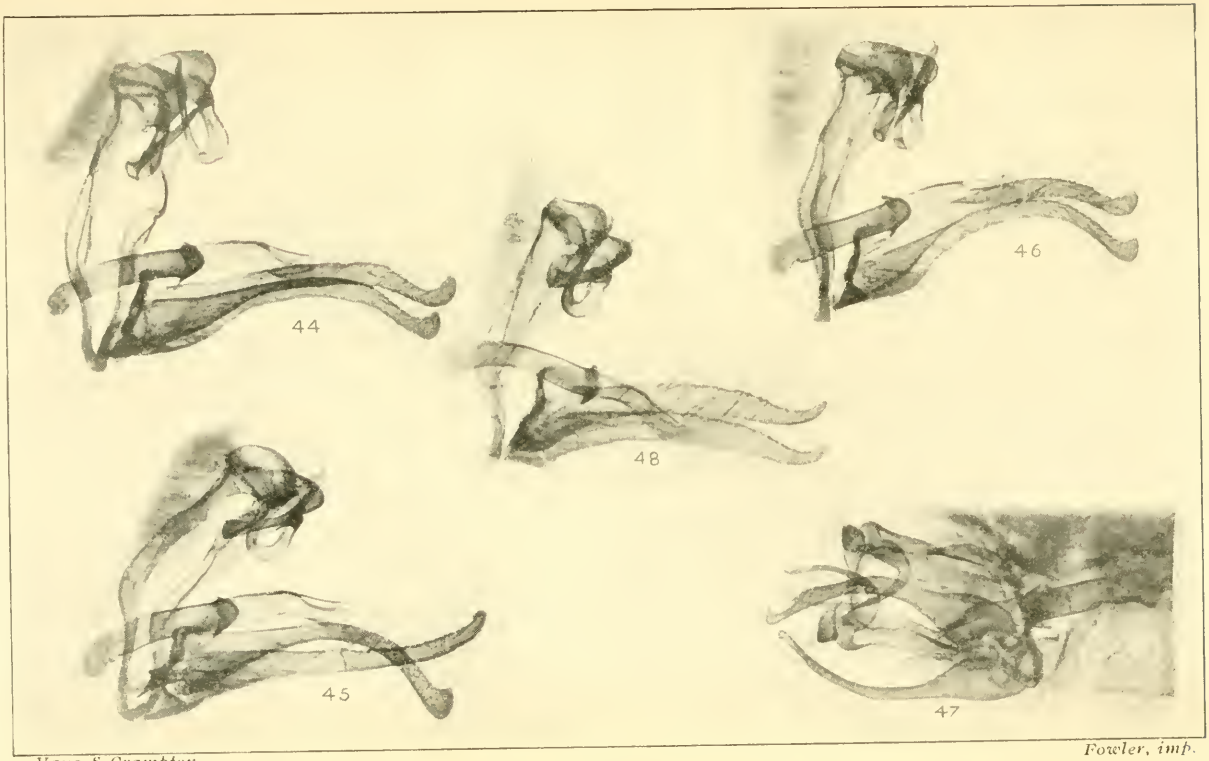
Vaus & Crampton *Fowler, imp.*

GENITALIA OF NEOCHRYSOPS



Vaus & Crampton *Fowler, imp.*

GENITALIA OF NEOCHRYSOPS



Vaus & Crampton *Fowler, imp.*

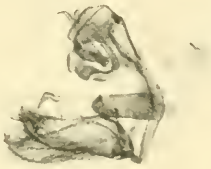
GENITALIA OF NEOCHRYSOPS

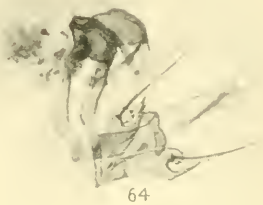
Vaus & Crampton *Fowler, imp.*

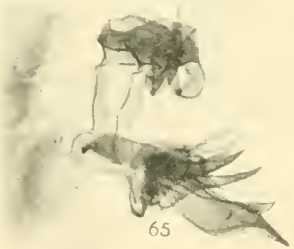
GENITALIA OF NEOCHRYSOPS
and EUCHRYSOPS

Vaus & Crampton *Fowler, imp.*

GENITALIA OF EUCHRYSOPS

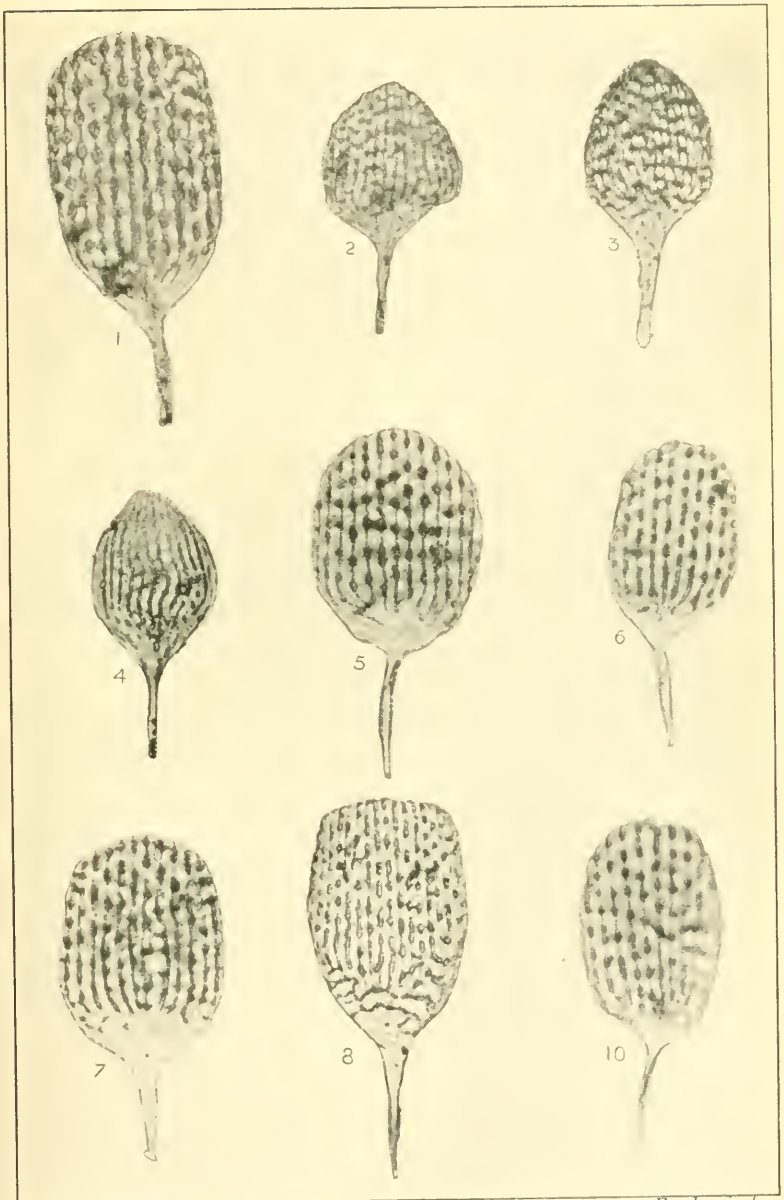






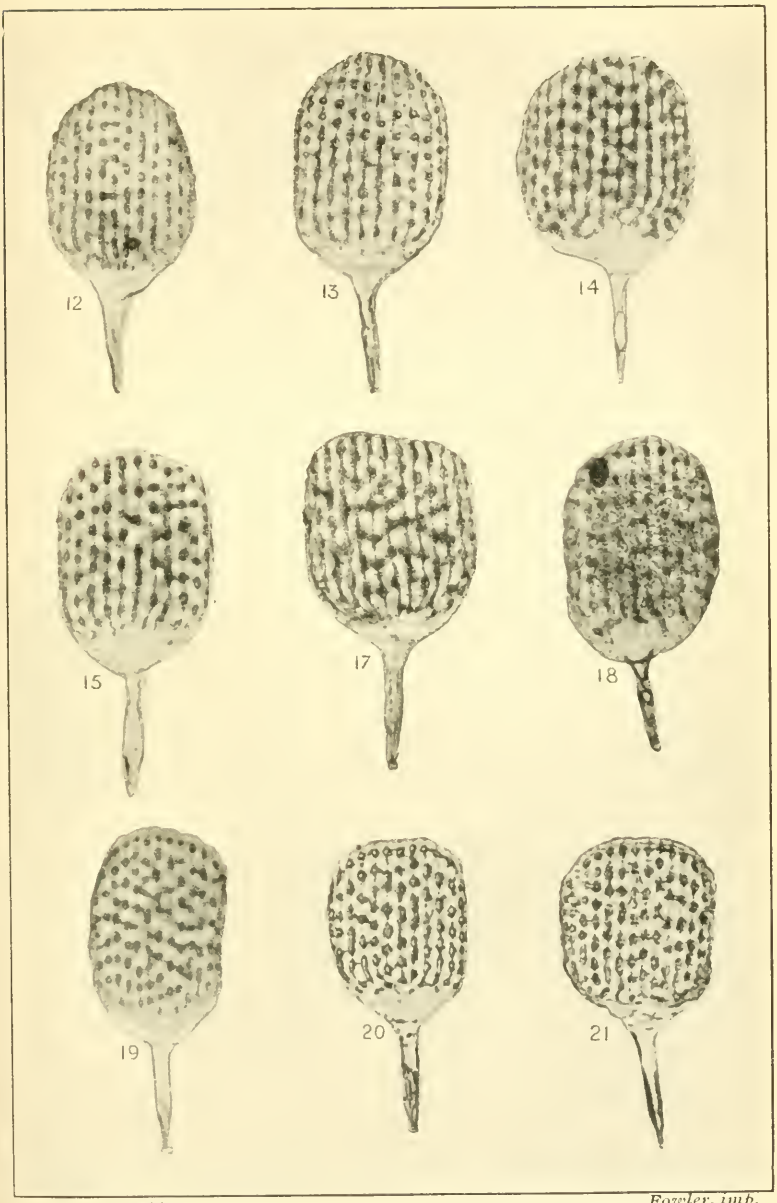
Vaus & Crampton *Fowler, imp.*

GENITALIA OF EUCHRYSOPS, CATOCHRYSOPS
and LYCAENOPSIS



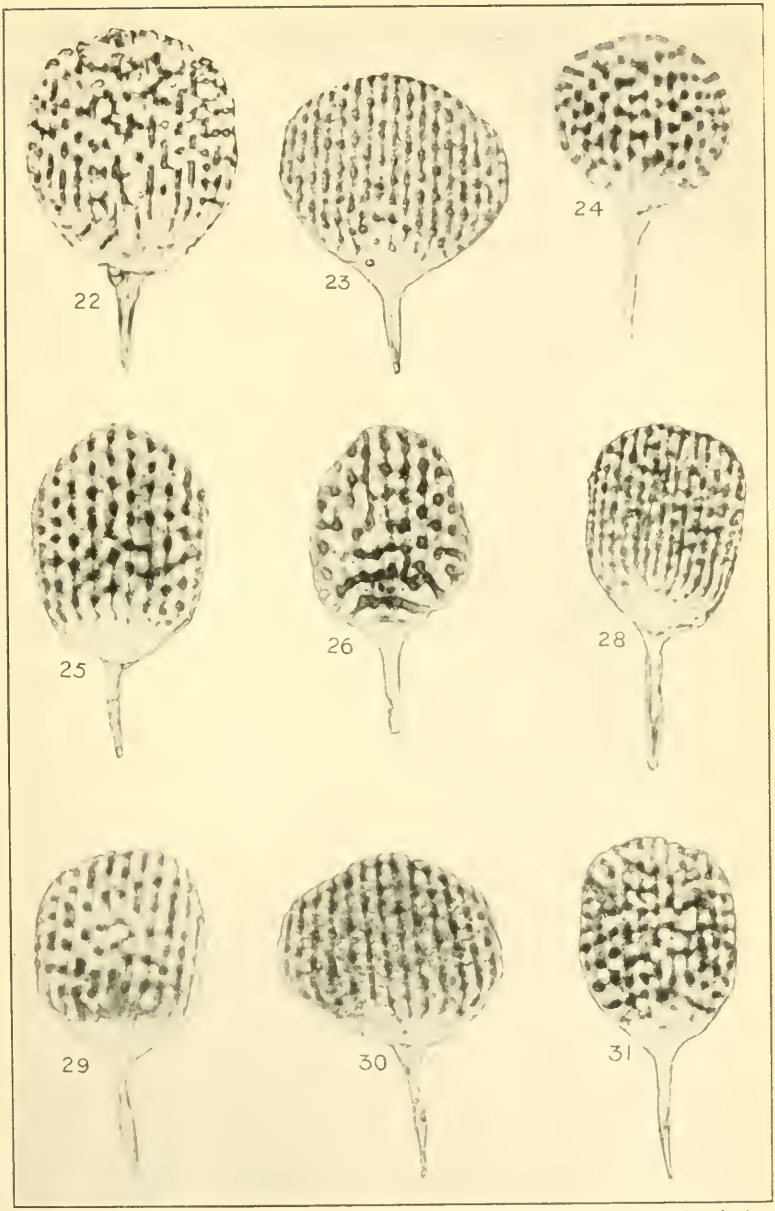
Vaus & Crampton *Fowler, imp.*

ANDROCONIA OF NEOCHRYSOPS



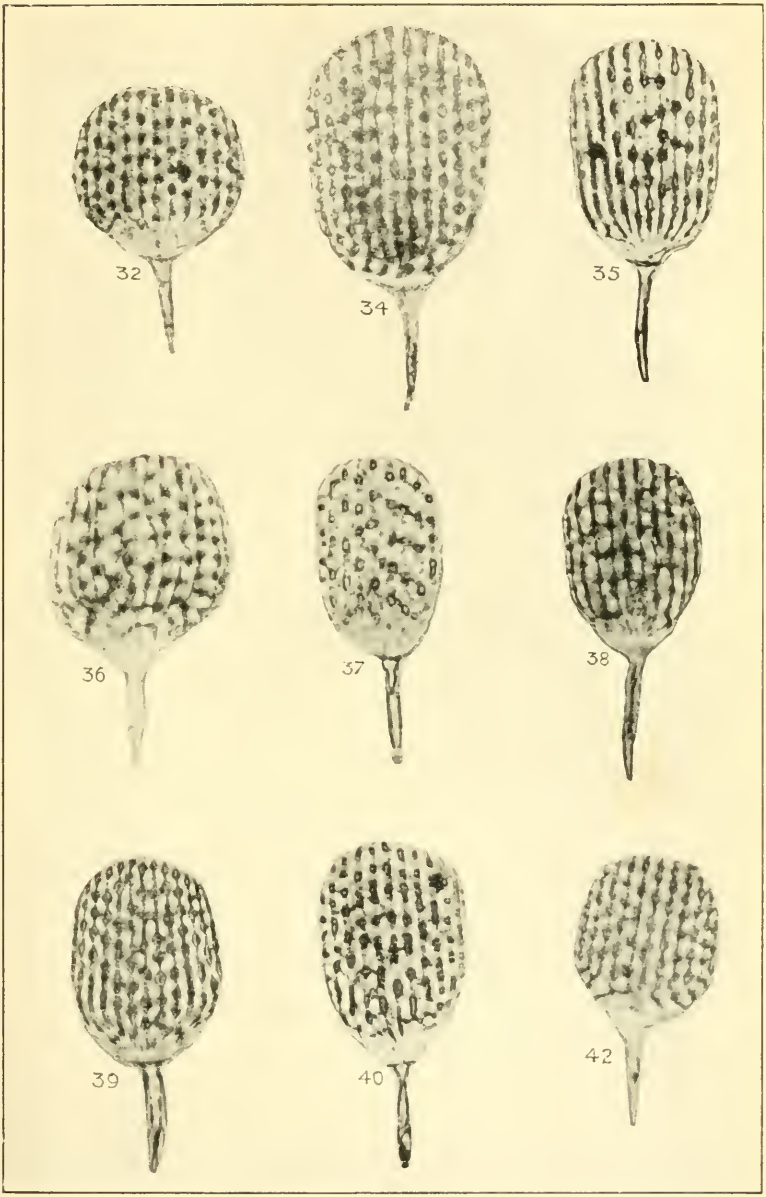
Vaus & Crampton *Fowler, imp.*

ANDROCONIA OF NEOCHRYSOPS



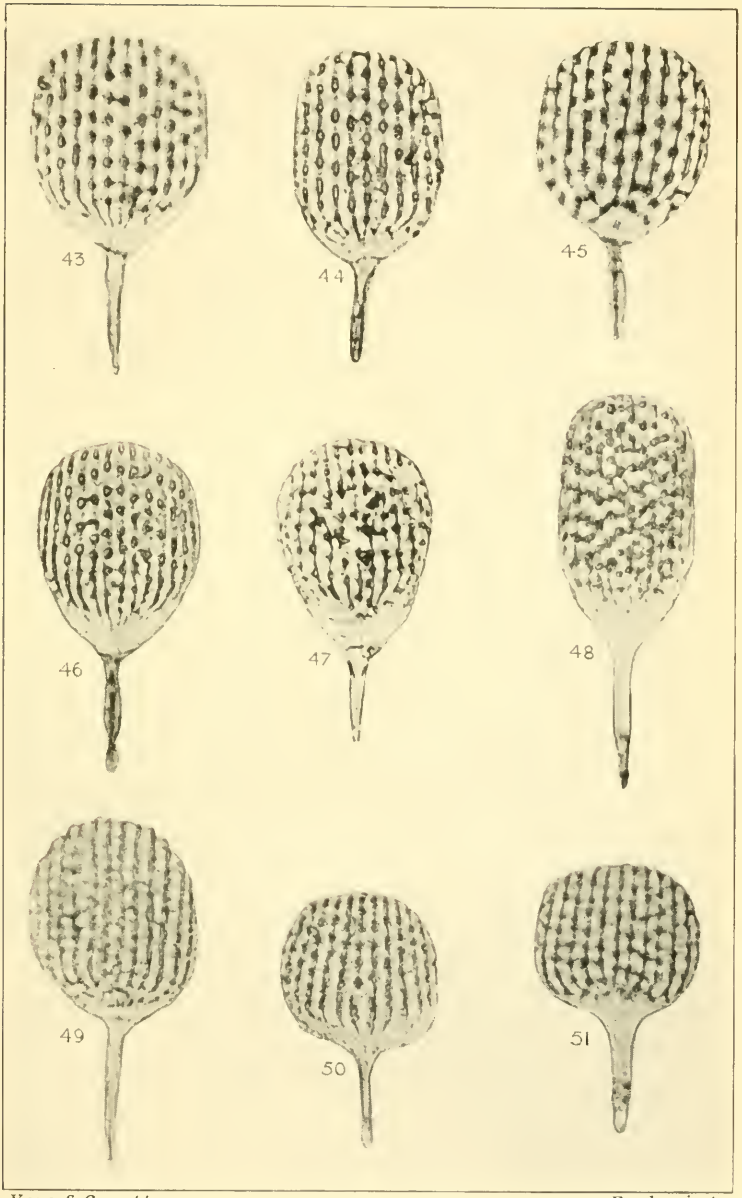
Vaus & Crampton *Fowler, imp.*

ANDROCONIA OF NEOCHRYSOPS



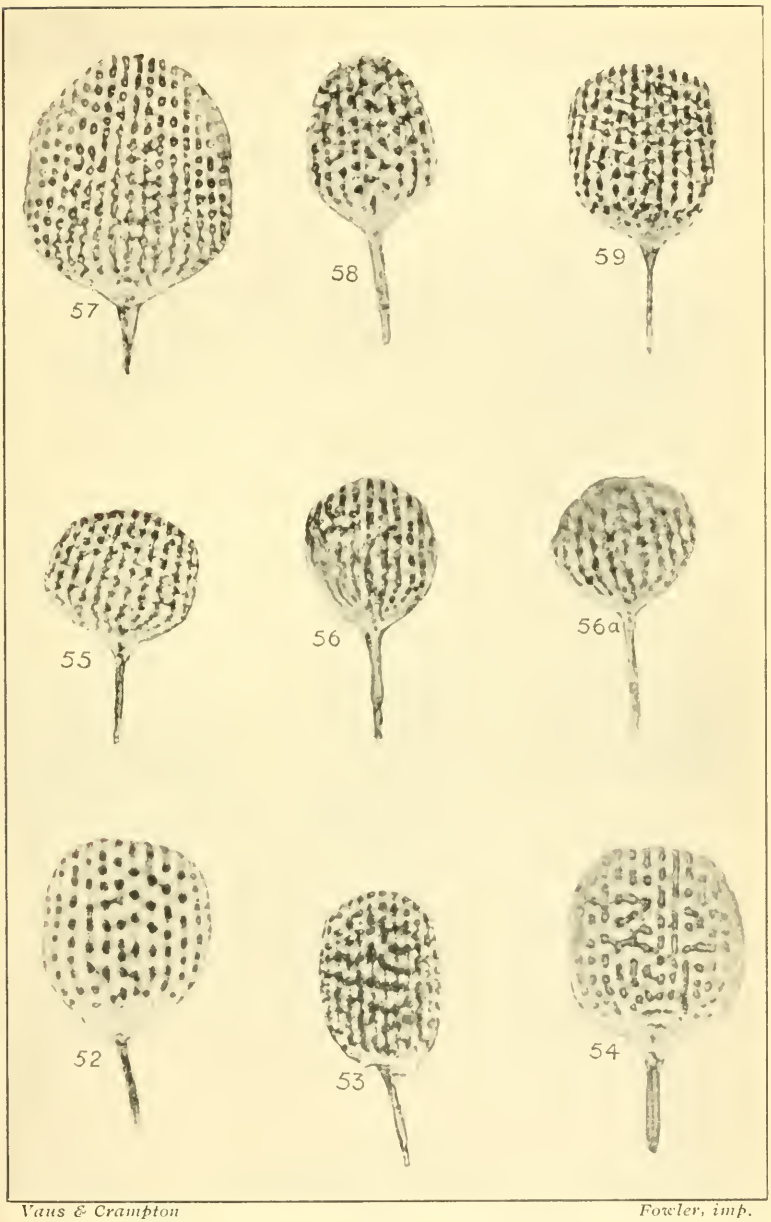
Vaus & Crampton *Fowler, imp.*

ANDROCONIA OF NEOCHRYSOPS



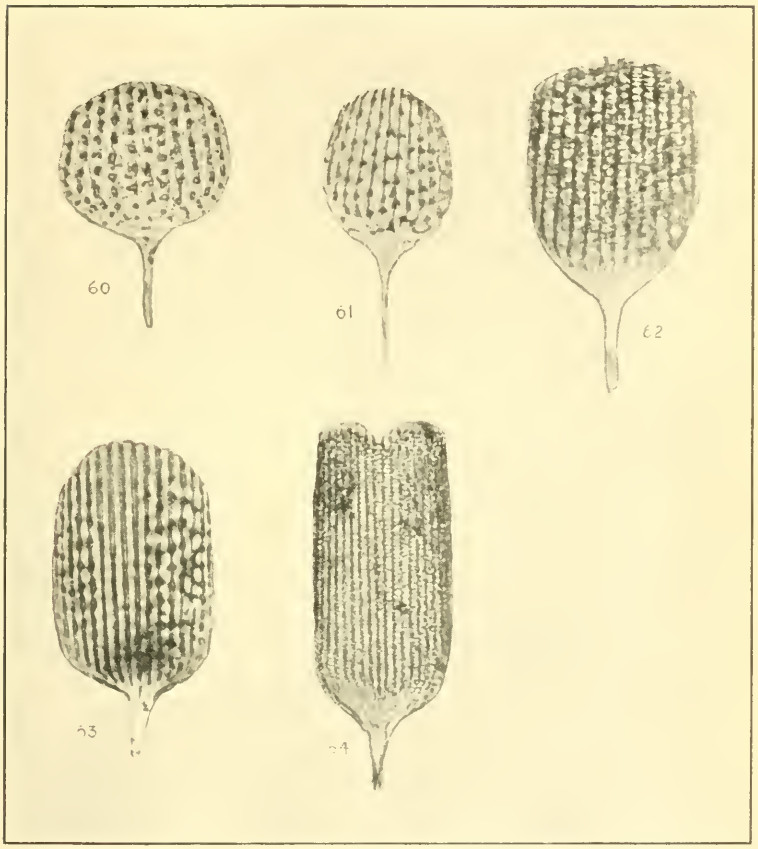
Vaus & Crampton *Fowler, imp.*

ANDROCONIA OF NEOCHRYSOPS and EUCHRYSOPS



Vaus & Crampton *Fowler, imp.*

ANDROCONIA OF EUCHRYSOPS



Vaus & Crampton *Fowler, imp.*

ANDROCONIA OF EUCHRYSOPS and
ABNORMAL ANDROCONIA OF NEOCHRYSOPS

fairly broad, with a high ridged tegumen and fairly ample rounded cheeks well supplied with bristles; falces fairly long.

Androconia very small, almost round, slightly pyriform, with very long fine attachment stalks, with ten rows of reticulations, closely appressed vertically.

Euchrysops cyclopteris Butler. Plates XII, fig. 10; XXIV, fig. 57; XXXI, fig. 57.

Lampides cyclopteris Butler, Ann. and Mag. N.H., p. 483 (1876).

Cupido cyclopteris Aurivillius, Rhop. Aethiop., p. 374 (1898).

♂. Upperside, both wings pale lavender violaceous, with the termen very broad and in the primaries, increasing in width towards the tornus, also with a spot closing the cell; in the secondaries there is a black subanal spot with a small internal edging of orange, and a terminal row of spots. A fine longish tail. Underside, both wings very pale grey, with slightly darker spots edged with white; a spot closes the cell in both wings also. Primaries with the postmedian series composed of six rather small spots, the upper four not quite regular, the fifth obliquely shifted inwards, the sixth again oblique; a subterminal series of internervular crenulations and a terminal row of semilunular spots. Secondaries with the usual four black spots near the base and the fifth beyond the centre below vein 8; in the postmedian series of six spots, the second is shifted outwards and the third, fourth and fifth is each shifted slightly inwards, the sixth very slightly outwards; the subterminal row of internervular crenulations is edged internally by sagittate white marks, and is followed by the terminal row of largish spots in a white ground; the black subanal spot has metallic scales and is edged internally by a largish orange patch.

Expanse, ♂ 34–36 mm.

Hab. Abyssinia; Nigeria.

Type in the British Museum.

A well-marked species.

Genitalia. Harpagines short, very broad indeed at the base, most irregular on the upper margin and waved evenly on the lower margin, tapering fairly rapidly to a third from the apex, where they are suddenly reduced and upturned into longish moderately fine, sharply toothed hooks; there is a moderate supply of longish bristles; anellus moderately broad; aedoeagus short and broad; cingulum of moderate length, and fairly broad; tegumen a high narrow

ridge, with cheeks curved upwards into an elongated squarish apex with the front edge erect and very long fine falces; the cheeks are very sparingly furnished with fine hairs.

Androconia broad, ovate, with distal and proximal margins broad, attachment stalk fairly strong; eighteen rows of reticulations whose sculpturing is very fine; the reticulations are fairly closely placed both horizontally and vertically.

Euchrysops nandensis Neave. Plates XXIV, fig. 58; XXXI, fig. 58.

Catochrysops nandensis Neave, Nov. Zool., xi, p. 340, Pl. 1, fig. 11 (1904).

♂. Upperside, both wings dark brown with the basal three-quarters of the wing to about the middle (horizontally) of the cell dull violet blue. Primaries with the cell closed by a dark dash. Secondaries with a black subanal spot plentifully edged internally with deep orange, and with a terminal row of dusky spots. Underside, both wings warm greyish brown with definite darker markings sharply edged with white. Primaries: a subreniform spot closes the cell; the postmedian series is composed of six spots, the upper four very generally in an even curve, the fifth placed obliquely, below which is the sixth; the subterminal series of internervular lunules edged internally with white, slightly inclined to sagittation; terminal row composed of small oval spots. Secondaries with four small black basal spots placed as usual, and a fifth almost before the centre of the costa below vein 8; cell closed by an angled dash; postmedian series is irregular and composed of six spots, the uppermost isolated, the second shifted well outwards, the third inwards, fourth inwards and very small, fifth well inwards, sixth outwards; a subterminal row of internervular lunules, edged internally with broad subsagittate white dashes almost filling the area between them and the postmedian series; a terminal row of spots with a subanal black spot edged plentifully with deep orange. No tails.

Expanse, 29–32 mm.

Hab. Wyangori (Kisumu), N'joro, Nairobi, B.E.A.
Type in the Oxford Museum.
This is a very well-marked species.

Genitalia. Harpagines short, of moderate width, ham-shaped at the base, tapering slowly to a very blunt apex, slightly hooked upwards at the extreme tip; the lower edge is well hollowed out, and the upper edge is but slightly curved; there is a plentiful

supply of bristles both fore and aft; anellus a simple ring; aedoeagus short, moderately broad; cingulum curved forwards, rather short and of moderate width; tegumen a high narrow-ridged collar with ample cheeks well supplied with bristles, and with long falces.

Androconia small, variable, mostly roundish with long attachment stalks, but many varying almost to oblong; eight or nine rows of reticulations whose sculpturing is deep and strongly accentuated; the rows are placed well apart, but the reticulations are fairly close vertically.

Euchrysops kabrosae B.-B. Plates XII, fig. 14; XXIV, fig. 59.

Catochrysops kabrosae Bethune-Baker, Ann. and Mag. N.H., p. 107 (1906).

♂. Upperside, both wings cigar brown with greyish fringes. Primaries with a trace of a dash closing the cell. Secondaries with a large orange patch occupying a considerable area in the anal area, in which there is a small black subanal spot. Underside, both wings brownish grey with black and brown spots and marks edged with white. Primaries with a black spot closing the cell; the postmedian series of five black spots is arranged in an even curve inclined more basewards at the lower spots; an obscure subterminal row of internervular dashes followed by a similar terminal row of spots. Secondaries with the usual four basal black spots, which are very small, and a fifth black spot beyond the middle below vein 8; the postmedian series of six spots the same colour as the ground, has the second spot shifted outwards, the third larger, shifted inwards, the fourth very small, inwards again, and the fifth yet further inwards, sixth slightly outwards; a subterminal row of lunules edged internally by sagittate white marks and followed by the terminal row of spots; a subanal black spot almost surrounded with orange.

♀. Like the male in all respects above and below.

The type female described from a unique specimen taken at Kabros has the underside decidedly paler than the N'joro specimens and is larger in size, otherwise it is precisely like the male now described for the first time.

Expanse, ♂ 26–28; ♀ 26–30 mm.

Hab. Kabros, N'joro, B.E.A. (*Jackson*).
Types in my collection, three ♂ and 2 ♀.

This is a quite unmistakable little species, and from the genitalia should be placed in this section.

Genitalia. Harpagines with broad spatulate base, suddenly reduced about the middle on the upper and lower margin into a long tongue-like extremity; the bristles are rather stout and are confined to the broad basal portion; anellus well developed with a waived-front margin; aedoeagus short and fairly broad; cingulum short, curved forward, fairly broad; tegumen a very narrow well-raised ridge at the rear, with ample lobe-shaped cheeks having fairly stout and longish falces; the bristles on the cheeks are fine and not abundant. There are no androconia.

Euchrysops malathana Boisduval. Plates XXV, fig. 60; XXXI, fig. 59.

Lycaena malathana Boisduval, Faun. Madag., p. 25 (1833).
Lycaena asopus Hopffer, Monats. Akad. Wiss. Berlin, p. 642 (1855); *id.* Peters, Reise. Mosamb. Ins., p. 410; Pl. 26, figs. 13–15 (1862).
Lycaena kama Trimen, Trans. Ent. Soc. Lond., p. 403 (1862).
Lycaena asopus Trimen, Rhop. Afr. Austr., p. 249 (1866).
Lycaena conguensis Mabille, Bull. Soc. Zool. Fr., ii, p. 218 (1877).
Lycaena asopus Trimen, S. Afr. Butt., ii, p. 16 (1887).
Catochrysops asopus Butler, P.Z.S. Lond., p. 483 (1884); *id. idem*, p. 756 (1885).
Catochrysops conguensis Butler, P.Z.S. Lond., p. 756 (1885).
Lycaena malathana Mabille, Hist. Mad. Lep., i, p. 219, Pl. 28, figs. 5–10 (1885–86).
Catochrysops asopus Butler, P.Z.S. Lond., p. 68 (1888); *id.* Karsch, Berlin Ent. Zeit., 38, p. 225 (1893); *id.* Butler, P.Z.S. Lond., p. 842 (1897); *id. idem* P.Z.S. Lond., p. 192 (1898).
Cupido malathana Aurivillius, Rhop. Aethiop., p. 373 (1898).
Catochrysops malathana Neave, p. 58 (1910); *id.* Longstaff, Trans. Ent. Soc. Lond., p. 277 (1916).

♂. Upperside, both wings a peculiar sublustrous shade of brownish grey with the finest black linear termen. Primaries with a dark dash closing the cell and an obscure terminal row of internervular dashes. Secondaries with a terminal row of spots palely encircled and preceded by a subterminal row of lunules, which are edged internally with small white sagittate marks; a deep black subanal

spot edged internally with orange. Underside, both wings pale grey with markings very slightly darker encircled with white. Primaries with a spot closing the cell; the postmedian series of six oval spots very regular and somewhat waived situated close to the subterminal row of internervular lunules, which is followed by the terminal row of dashes. Secondaries with four subbasal spots below each other, of these the uppermost is generally black, the two in the middle close together, and the lowest, on the inner margin, appearing to belong to the postmedian series are scarcely darker than the ground-colour; a small spot on the inner margin near the base, and a black spot beyond the centre of the costa below vein 8; cell closed by a spot; postmedian series with the upper spot isolated, the second shifted outwards, the third, fourth and fifth each shifted slightly inwards, but in a slightly oblique alignment, fifth reniform, shifted outwards; a terminal row of spots preceded by a subterminal row of internervular lunules, these being edged by a series of white sagittate marks, a subanal black spot with bright metallic scaling and edged internally with orange. No tails.

♀ Upperside, both wings lustrous pale blue, quite dull at certain angles of light, but bright lustrous at others, with very broad borders all round; otherwise quite like the male.

Expanse, ♂ and ♀ 34–36 mm.

Hab. Africa, generally distributed; Madagascar, Aden. Type in the Oberthür collection.

Genitalia. Harpagines broad and short sub-wedge-shaped, terminating in a shortish sharp upturned hook; lower margin with a dense covering of bristles, becoming more dense at the apex; upper margin with a few long strong bristles; anellus well developed, with a conical front margin; aedoeagus short and of moderate width; cingulum of but moderate length and of narrow width; tegumen a narrow ridge at the rear with moderately ample cheeks somewhat lobe-shaped, which are very poorly furnished with bristles; falces of moderate size; broadly curved.

Androconia battledore-shaped, with nine rows of reticulations, widely separated, especially so horizontally.

Euchrysops osiris Hopffer. Plates XXV, fig. 61; XXXII, fig. 60.

Lycaena osiris Hopffer, Monats. Akad. Wiss. Berlin, p. 642 (1855); *id.* Peters, Reise. Mosamb. Ins., p. 409, Pl. 26, figs. 11, 12 (1862).

Lycaena anubis Snellen, Ent. Tids., p. 21, Pl. i, figs. 6–9 (1872).
Lycaena phoa Snellen, *l.c.*, p. 22 (1872).
Lycaena pyrrhops Mabille, Bull. Soc. Zool. Fr., ii, p. 217 (1877).
Lycaena osiris Trimen, S. Afr. Butt., ii, p. 15 (1887).
Catochrysops osiris Butler, P.Z.S. Lond., p. 68 (1888).
Lycaena osiris Trimen, Trans. Ent. Soc. Lond., p. 127 (1893); *id.* Karsch, Berlin Ent. Zeit., 38, p. 225 (1893).
Catochrysops osiris Butler, P.Z.S. Lond., p. 692 (1897).
Cupido osiris Aurivillius, Rhop. Aethiop., p. 374 (1898).
Catochrysops osiris Neave, P.Z.S. Lond., p. 58 (1910).
Catochrysops cuprescens E. M. Sharpe, in Neumann, Elephant Hunting, p. 442, Pl. figs. 3, 3*a* (1898).

♂. Upperside, both wings pinkish violaceous lilac colour—sometimes pale violet with very narrow brown borders. Primaries with an obscure grey dash closing the cell. Secondaries with anal and subanal black spots, each having an internal orange edging. With fine tails. Underside, both wings very pale whitish grey with rather darker spots encircled with white. Primaries with a narrow dash closing the cell; the postmedian series of six narrow spots fairly regular, the spots increasing in length towards the tornus, a narrow terminal continuous row of dashes so as to appear a line, preceded by a broader row of subterminal internervular dashes. Secondaries with three small black spots and a fourth beyond the middle of the costa below vein 8; a narrow curved dash closes the cell; the postmedian series of seven spots is fairly even, the second spot is shifted somewhat outwards and forms with spots three, four and five a slightly irregular inward curve, sixth spot shifted well outwards, the seventh (usually the lowermost black spot, but not black in this species) is shifted inwards; the terminal row of narrow oval spots is preceded by a row of internervular lunules that are broadly edged with white, anal and subanal black spots with metallic scaling and internal edgings of orange.

♀. Variable. Upperside, both wings dark brown with a smaller or larger patch of violet colour, sometimes, however, it is rather lustrous blue, and occasionally very pale. Underside like the male, but with the pattern more strongly accentuated.

Expanse, ♂ 34–38; ♀ 34–39 mm.

Hab. Africa, very widely spread; Madagascar.

Type in the British Museum.

I fortunately had the loan of Mabille's type of *C. pyrrhops* some time ago, and it is only a female of this species.

Genitalia. Harpagines short, broadish, somewhat constricted at about two-thirds the length, then expanding somewhat into a rounded apex shortly and strongly dentate all round the curve; an abundant supply of long strong bristles; anellus with the front edge rounded; the aedoeagus is short and broad; cingulum shortish, rather narrow angled forward at a third from the base; tegumen a narrow raised ridge at the rear, with lobe-shaped cheeks of but moderate size having a small supply of fine bristles; falces long and strong.

Androconia very plentiful, slightly variable in size, pomegranate-shaped with longish attachment stalk; thirteen rows of reticulations fairly well separated, whose sculpturing is deep and placed moderately near together.

The androconia of *brunneus* differ from those of *osiris;* they are far from plentiful, of an oblong shape tapering off to the attachment stalk, whose stem is not long, with eleven or twelve rows of reticulations fairly close together, and whose deep sculpturing is also close together.

Euchrysops brunneus, sp. n. Plates XXV, fig. 62; XXXII, fig. 61.

♂ Upperside, both wings brown with a slight reddish tinge and a slight bronze lustre; a large orange anal patch, in which are two well-defined black terminal spots. Underside not so pale as in *osiris* and with the pattern darker also; otherwise like *osiris.*

♀. Like *osiris.*

This is a very well-marked race obtaining in the mountains around Nairobi. I have a long series, and they are all quite uniform; it appears to be a more robust insect than *osiris,* the average of both sexes being larger.

Hab. Nairobi District, B.E.A.

Types in my collection.

At first I thought this species was merely a local race of *E. osiris,* but the androconia are so markedly different, as detailed under the previous species, that I feel compelled to separate them. The genitalia are also slightly different; the shape of the harpagines is not the same, both in the curves and in the apices, whilst the aedoeagus and the anellus are also slightly different.

In closing this monograph it will be well to again draw attention to the figure of the genitalia of *Catochrysops*

strabo (Plate XXV, fig. 63), and also to the figures of the same organs of *Lycaenopsis micyclus* (Plate XXV, fig. 64) and of *L. togara* (Plate XXV, fig. 65).

I must not, however, end without tendering my warmest thanks to Prof. Poulton for very much critical help, and for the free use of the specimens in the Hope Museum, and also to the officials of the British Museum for their unfailing courtesy and aid, whilst I am much indebted to Mr. J. J. Joicey for the loan of all Trimen's types, and to the late Mr. H. H. Druce for enabling me to refer to his collection.

Explanation of Plates XII–XXXII.

PLATE XII.

Fig. 1. *Neochrysops niobe*, p. 280.
2. ,, *lacrimosa*, p. 281.
3. ,, *methymna*, p. 287.
4. ,, *intermedia*, ♂, p. 310.
5. ,, ,, ♀, p. 310.
6. ,, *asteris*, p. 292.
7. ,, *trimeni*, p. 295.
8. ,, *variegata*, p. 338.
9. ,, *nevillei*, p. 340.
10. *Euchrysops cyclopteris*, p. 355.
11. ,, *katangae*, p. 354.
12. ,, *albistriatus*, p. 353.
13. ,, *mauensis*, p. 352.
14. ,, *kabrosae* p. 357.
15. ,, *subpallida*, p. 350.
16. *Neochrysops letsea* (*fumosus* type), p. 312.
17. ,, *cinerea*, p. 314.
18. ,, *plebeja*, p. 316.
19. ,, *parsimon*, p. 317.
20. ,, *victoriae*, p. 320.
21. ,, *quassi*, p. 322.

PLATE XIII.

Fig. 1. *Neochrysops gigantea*, p. 299.
2. ,, *stormsi*, p. 300.
3. ,, *mashuna*, ♂, p. 301.
4. ,, ,, ♀, p. 301.
5. ,, *rhodesensae*, p. 302.
6. ,, *delicata*, ♂, p. 303.
7. ,, ,, ♀, p. 303.
8. ,, *neavei*, ♂, p. 307.
9. ,, *peculiaris*, p. 305.
10. ,, *neavei*, ♀, p. 307.
11. ,, *cupreus*, p. 306.
12. ,, *dollmani*, p. 309.

PLATE XIV.

FIG. 1. *Neochrysops synchrematiza*, p. 323.
2. „ *solwezii*, p. 325.
3. „ *chloauges*, p. 328.
4. „ *glauca*, p. 326.
5. „ *polydialecta*, p. 329.
6. „ *carsoni*, p. 334.
7. „ *patricia*, p. 333.
8. „ *neonegus*, p. 337.
9. „ *aethopia*, p. 331.
10. „ *nyassae*, p. 332.
11. „ *hypopolia*, p. 343.
12. „ *negus*, p. 335.

PLATE XV.

All genitalia are magnified 25 diameters and then reduced fully a third to bring them down to the necessary size of plate.

FIG. 1. Genitalia, vertical position of *Neochrysops leucon*, p. 289.
1*a*. Aedoeagus of *Neochrysops leucon*, p. 289.
2. Genitalia, profile position of *Neochrysops niobe*, p. 281.
3. „ „ „ „ „ *lacrimosa*, p. 282.
4. „ „ „ „ „ *ariadne*, p. 283.
5. „ „ „ „ „ *tantalus*, p. 284.
5*a*. „ vertical „ „ „ „ p. 284.

PLATE XVI.

FIG. 6. Genitalia, profile position of *Neochrysops ignota*, p. 285.
7. „ „ „ „ „ *pephredo*, p. 286.
8. „ „ „ „ „ *methymna*, p. 287.
9. „ „ „ „ „ *puncticilia*, p. 288.
10. „ „ „ „ „ *pampolis*, p. 291.
12. „ „ „ „ „ *asteris*, p. 294.
13. „ „ „ „ „ *trimeni*, p. 296.
14. „ vertical „ „ „ *grahami*, p. 297.

PLATE XVII.

FIG. 15. Genitalia, profile position of *Neochrysops ortygia*, p. 298.
16. „ „ „ „ „ *lerothodi*, p. 299.
16*a*. „ vertical „ „ „ *lerothodi*, p. 299.
17. „ profile „ „ „ *gigantea*, p. 300.
18. „ „ „ „ „ *stormsi*, p. 301.

PLATE XVIII.

FIG. 19. Genitalia, profile position of *Neochrysops mashuna*, p. 302.
20. „ „ „ „ „ *rhodesensae*, p. 303.
21. „ „ „ „ „ *delicata*, p. 304.
22. „ „ „ „ „ *peculiaris*, p. 306.
23. „ „ „ „ „ *cupreus*, p. 307.
24. „ „ „ „ „ *neavei*, p. 308.

PLATE XIX.

FIG. 25. Genitalia, profile position of *Neochrysops dollmani*, p. 310.
26. ,, ,, ,, ,, ,, *intermedia*, p. 311.
28. ,, ,, ,, ,, ,, *letsea*, p. 313.
29. ,, ,, ,, ,, ,, *cinerea*, p. 314.
30. ,, ,, ,, ,, ,, *skotios*, p. 315.
31. ,, ,, ,, ,, ,, *plebeja*, p. 317.

PLATE XX.

FIG. 32. Genitalia, profile position of *Neochrysops parsimon*, p. 320.
33. ,, vertical ,, ,, ,, *victoriae*, p. 321.
34. ,, profile ,, ,, ,, *quassi*, p. 323.
35. ,, ,, ,, ,, ,, *synchrematiza*, p. 324.
36. ,, ,, ,, ,, ,, *solvezii*, p. 326.
37. ,, ,, ,, ,, ,, *glauca*, p. 327.

PLATE XXI.

FIG. 38. Genitalia, profile position of *Neochrysops chloauges*, p. 329.
39. ,, ,, ,, ,, ,, *polydialecta*, p. 330.
40. ,, ,, ,, ,, ,, *aethiopia*, p. 332.
42. ,, ,, ,, ,, ,, *patricia*, p. 334.
43. ,, ,, ,, ,, ,, *carsoni*, p. 334.

PLATE XXII.

FIG. 44. Genitalia, profile position of *Neochrysops negus*, p. 336.
45. ,, ,, ,, ,, ,, *neonegus*, p. 338.
46. ,, ,, ,, ,, ,, *variegata*, p. 339.
47. ,, twisted ,, ,, ,, *nevillei*, p. 341.
48. ,, profile ,, ,, ,, *procera*, p. 342.

PLATE XXIII.

FIG. 49. Genitalia, profile position of *Neochrysops hypopolia*, p. 343.
50. ,, ,, ,, ,, *Euchrysops cnejus*, p. 346.
50*a*. ,, ,, ,, ,, ,, *luzonicus*, p. 347.
51. ,, ,, ,, ,, ,, *barkeri*, p. 348.
52. ,, ,, ,, ,, ,, *dolorosa*, p. 349.
52*a*. ,, vertical ,, ,, ,, ,, p. 349.

PLATE XXIV.

FIG. 53. Genitalia, twisted position of *Euchrysops subpallida*, p. 351.
54. ,, profile ,, ,, ,, *mauensis*, p. 352.
55. ,, ,, ,, ,, ,, *albistriatus*, p. 353.
56. ,, ,, ,, ,, ,, *katangae*, ♂, p. 354.
56*a*. ,, ,, ,, ,, ,, ,, ♀, p. 354.
57. ,, ,, ,, ,, ,, *cyclopteris*, p. 355.
58. ,, ,, ,, ,, ,, *nandensis*, p. 356.
59. ,, ,, ,, ,, ,, *kabrosae*, p. 358.

PLATE XXV.

FIG. 60. Genitalia, profile position of *Euchrysops malathana*, p. 359.
61. ,, ,, ,, ,, ,, *osiris*, p. 361.
62. ,, ,, ,, ,, ,, *brunneus*, p. 361.
63. ,, ,, ,, ,, *Catochrysops strabo*, p. 362.
64. ,, ,, ,, ,, *Lycaenopsis micyclus*, p. 277.
65. ,, ,, ,, ,, ,, *togara*, p. 277.

PLATE XXVI.

All androconial scales are magnified 600 diameters.

FIG. 1. Androconia of *Neochrysops leucon*, p. 290.
2. ,, ,, ,, *niobe*, p. 281.
3. ,, ,, ,, *lacrimosa*, p. 283.
4. ,, ,, ,, *ariadne*, p. 283.
5. ,, ,, ,, *tantalus*, p. 284.
6. ,, ,, ,, *ignota*, p. 285.
7. ,, ,, ,, *pephredo*, p. 286.
8. ,, ,, ,, *methymna*, p. 288.
10. ,, ,, ,, *pampolis*, p. 291.

PLATE XXVII.

FIG. 12. Androconia of *Neochrysops asteris*, p. 295.
13. ,, ,, ,, *trimeni*, p. 296.
14. ,, ,, ,, *grahami*, p. 297.
15. ,, ,, ,, *ortygia*, p. 298.
17. ,, ,, ,, *gigantea*, p. 300.
18. ,, ,, ,, *stormsi*, p. 301.
19. ,, ,, ,, *mashuna*, p. 302.
20. ,, ,, ,, *rhodesensae*, p. 303.
21. ,, ,, ,, *delicata*, p. 304.

PLATE XXVIII.

FIG. 22. Androconia of *Neochrysops peculiaris*, p. 306.
23. ,, ,, ,, *cupreus*, p. 307.
24. ,, ,, ,, *neavei*, p. 309.
25. ,, ,, ,, *dollmani*, p. 310.
26. ,, ,, ,, *intermedia*, p. 311.
28. ,, ,, ,, *letsea*, p. 313.
29. ,, ,, ,, *cinerea*, p. 315.
30. ,, ,, ,, *skotios*, p. 316.
31. ,, ,, ,, *plebeja*, p. 317.

PLATE XXIX.

Fig. 32. Androconia of *Neochrysops parsimon*, p. 320.
34. ,, ,, ,, *quassi*, p. 323.
35. ,, ,, ,, *synchrematiza*, p. 325.
36. ,, ,, ,, *solwezii*, p. 326.
37. ,, ,, ,, *glauca*, p. 327.
38. ,, ,, ,, *chloauges*, p. 329.
39. ,, ,, ,, *polydialecta*, p. 330.
40. ,, ,, ,, *aethiopia*, p. 332.
42. ,, ,, ,, *patricia*, p. 334.

PLATE XXX.

Fig. 43. Androconia of *Neochrysops carsoni*, p. 335.
44. ,, ,, ,, *negus*, p. 337.
45. ,, ,, ,, *neonegus*, p. 338.
46. ,, ,, ,, *variegata*, p. 339.
47. ,, ,, ,, *nevillei*, p. 341.
48. ,, ,, ,, *procera*, p. 342.
49. ,, ,, ,, *hypopolia*, p. 343.
50. ,, ,, *Euchrysops cnejus* p. 346.
51. ,, ,, ,, *barkeri*, p. 348.

PLATE XXXI.

Fig. 52. Androconia of *Euchrysops dolorosa*, p. 350.
53. ,, ,, ,, *subpallida*, p. 351.
54. ,, ,, ,, *mauensis*, p. 353.
55. ,, ,, ,, *albistriatus*, p. 354.
56. ,, ,, ,, *katangae*, p. 355.
56*a*. ,, ,, ,, *katangae*, abnormal scale, p. 355.
57. ,, ,, ,, *cyclopteris*, p. 356.
58. ,, ,, ,, *nandcusis*, p. 357.
59. ,, ,, ,, *malathana*, p. 359.

PLATE XXXII.

Fig. 60. Androconia of *Euchrysops osiris*, p. 361.
61. ,, ,, ,, *brunneus*, p. 361.
62. Abnormal androconia of *Neochrysops intermedia*. (Compare with scale No. 26.)
63. Abnormal androconia of *Neochrysops skotios*, abnormal scale. (Compare with scale No. 30.)
64. Abnormal androconia of *Neochrysops methymna*, abnormal scale. (Compare with scale No. 8.)

XIV. *The Dasytinae of South Africa* (*Coleoptera*). By G. C. Champion, A.L.S., F.Z.S.

[Read April 5th, 1922.]

This paper is based upon a study of the comparatively few known S. African Dasytinae, two allied E. African insects being included for comparison. More than half of the former are referred to the genus *Pagurodactylus* Gorh., some of the species of which have the general facies of various Malachiids, thus forming a sort of connecting link between the last-named group and the Dasytids. The extensible lateral vesicles of the body are wanting in all the Dasytinae, and the males never have a claw-like superior prolongation of the second joint of the anterior tarsi such as is to be found in certain genera of Malachiids, e. g. *Attalus*, *Ebaeus*, etc. One new genus, *Dasytophasis* (Péring. in litt.) has peculiarly formed antennae in the ♂, and another, *Apterodasytes*, resembles a Staphylinid. The presence of the cosmopolitan genus *Acanthocnemus* Perris in Rhodesia, has been recorded by me in Ent. Mo. Mag., 1922, pp. 77–79.

The material examined includes that contained in the British Museum in London, and in the Museums at Cape Town and Durban, the Cape specimens having been kindly lent by Dr. Péringuey. The examples in our National Collection were mostly collected by Dr. G. A. K. Marshall, the late H. C. Dollman, and Mr. R. E. Turner, some of the last-named gentleman's captures having been received during the preparation of this paper.

The types of the S. African species named by Gorham, as well as those of a few others described by Boheman and Redtenbacher, have been examined. Three *Dasytes* diagnosed by Thunberg in 1821 remain unidentified, as well as the following insects described by Pic: *Pseudopecteropus*, type *P. nigerrimus* Pic (L'Echange, xix, p. 178, 1903), Cape Colony (this probably belongs to the Dasytinae); *P. pallidonotatus* Pic (*op. cit.* xxiii, p. 132, 1907), Dunbrody (this seems to be a *Pagurodactylus*, with a longitudinal black streak on each elytron); *Pagurodactylus donceeli* Pic (*op. cit.* xxiii, p. 132, 1907), Port Elizabeth; and *Xamerpus obscurus* Pic (*op. cit.* xx, p. 28, 1901), Zululand. *Microjulistus subconvexus*, var. *nigricolor* Pic (*op. cit.* xix, p. 179, 1903), Dunbrody, is represented by a single example in

Dr. Marshall's collection, and two others found by Mr. R. E. Turner at Mossel Bay in September 1921.

Pagurodactylus.

Pagurodactylus Gorham, Ann. and Mag. Nat. Hist. (7) v, p. 78 (1900).

This genus, type *P. vitticeps* from Natal, its Dasytiform facies notwithstanding, was referred by Gorham to the Malachiidae, and he called attention to the unequal anterior tarsal claws of the ♂ as a character not hitherto known in that group. *Pagurodactylus*, however, wants the extensible lateral vesicles of the prothorax and abdomen, and must therefore be removed to the Dasytinae, one well-known European genus at least, *Danacaea*, having unequal tarsal claws in the two sexes. The male only of *P. vitticeps* was known to Gorham; the ♀ has slender, basally-subangulate, equal tarsal claws, very similar to the lower one of the anterior pair in ♂. In this sex, moreover, the anterior tarsi are more or less thickened, with joints 1–3 obliquely produced at the apex (2 sometimes dentiform) in the typical forms, and 5, at least, nigro-setulose beneath, these short spinules or setae forming a sort of brush. The S. African forms here placed under *Pagurodactylus* differ greatly *inter se* in their general facies, the shape of the head, etc.; but they all possess the above-mentioned ♂ tarsal characters, which are sufficient to separate them from *Dasytes*, even in the wide sense adopted by European writers. Most of these insects have a short epipleural fold to the elytra, this being elongated in *P. angustissimus* Pic, but the dividing ridge is sometimes obsolete. The dentiform second tarsal joint and the elongated upper anterior tarsal claw together form a powerful grasping-organ in the ♂♂ of *P. fibulatus*, etc.

The terminal joint of the maxillary palpi is narrow, rather short, pointed at the tip.

The following table, based upon the ♂♂ only, will serve in most cases to identify the ♀♀ also.*

♂♂

1 (18). Head not or moderately rostrate.

2 (13). Upper surface pilose or with intermixed longer hairs or setae.

---

* ♀♀ only known of *P. lugens* (No. 6) and *flavocinctus* (No. 11).

3 (10). Body in part or wholly black or metallic.
4 (5). Prothorax, outer margin of elytra, and legs testaceous; antennae elongate; upper claw of anterior tarsi greatly elongated . . . . . Species 1.
5 (4). Prothorax and legs in great part or wholly infuscate.
6 (9). Elytra not fasciate, immaculate or with margins testaceous.
7 (8). Elytra infuscate or black . . . . Species 2–6.
8 (7). Elytra with one or both margins testaceous . . . . . Species 7, 8.
9 (6). Elytra flavo-fasciate; legs in part or wholly infuscate . . . . . Species 9–12.
10 (3). Body in part and legs testaceous; elytra usually maculate or fasciate, rarely immaculate (sometimes piceous with the margins and apex testaceous in ♀♀).
11 (12). Antennae short, serrate, or subserrate; head enormously developed or large Species 13–17.
12 (11). Antennae relatively longer and more slender; head smaller: species small . . . . . Species 18.
13 (2). Upper surface finely pubescent, without intermixed longer hairs; elytral sculpture very fine, sericeous.
14 (15). Body uniformly caeruleous . . . Species 19.
15 (14). Body black or piceous.
16 (17). Elytra with apex testaceous; head shorter . . . . . Species 20.
17 (16). Elytra with both margins testaceous; head longer and narrower, subrostrate; prothorax trisulcate, elongate . . . . . Species 21.
18 (1). Head strongly rostrate, narrow, the post-ocular portion elongate; body metallic, the elytra testaceous at tip . . . . . Species 22, 23.

1. Pagurodactylus fibulatus, n. sp.

♀. Elongate, narrow, shining, clothed with decumbent pallid pubescence intermixed with long, erect, bristly hairs; black, the

head in front and at the sides behind the eyes, the basal joints of the antennae, the prothorax, the outer margins of the elytra, and the legs (the bases of the posterior femora excepted) testaceous or rufo-testaceous. Head rather small, much narrower than the prothorax, closely, finely punctate, the eyes small; antennae short, slender, subserrate. Prothorax convex, nearly as long as broad, narrowed anteriorly and also narrowed towards the base, very sparsely, minutely punctate, the lateral margins explanate in their basal half. Elytra much wider than the prothorax, widened posteriorly, rounded at the tip; densely, rather coarsely punctured. Anterior tarsi slender, simple.

♂. Head larger, longer, and more convex, nearly as wide as the prothorax, the eyes larger, prominent; antennae stouter, elongate, joints 1–4 and the extreme bases of the others testaceous, 5–10 elongate triangular; anterior tarsi (fig. 1) thickened, sparsely nigro-setulose beneath, joint 2 produced into a strong tooth at the apex within, the upper claw extremely long and stout, the lower one much shorter and slender.

Length 3–3½ mm.

Hab. S. Africa, Frere and Estcourt, Natal (*Dr. Marshall*: i, 1893; iii, 1896; *Haviland, in Mus. Cape Town*).

Ten examples seen, including four ♂♂. Separable from *P. vitticeps*, Gorh., by the rufo-testaceous elytral margins, prothorax, legs, and basal joints of the antennae; the longer, smoother, convex prothorax; the ♂ with a larger head, long antennae, and the upper claw of the front tarsi extremely long and stout.

2. Pagurodactylus vitticeps.

♂. *Pagurodactylus vitticeps* Gorh., Ann and Mag. Nat. Hist. (7), v, p. 79 (1900).

♂. Anterior tarsi thickened, joints 2 and 5 sparsely nigro-setulose beneath, the upper claw very long, longer and stouter than the lower one; antennae long, joints 4–10 elongate triangular.

♀. Anterior tarsi slender, the claws shorter, equal, similar to the others; antennae short, more slender, joints 4–10 about as long as broad.

Hab. S. Africa, Estcourt, Natal (*Mus. Brit., Mus. Cape Town*).

The twelve specimens of this species before me include three ♀♀, the ♂ only having been known to Gorham. An elongate, narrow, shining, brassy-black, hirsute insect, with

the basal joints of the antennae in part, the head in front and along the middle, and the tibiae and tarsi testaceous; the upper surface rather coarsely punctured; the antennae elongate in ♂; the prothorax broader than long; the elytra narrowly margined.

3. **Pagurodactylus cribrosus**, n. sp.

♀. Moderately elongate, narrow, subparallel, shining; the entire upper surface coarsely, closely punctate (the punctures on the head very coarse and umbilicate), and clothed with long, fine, erect hairs; nigro-piceous, the anterior portion of the head and the basal joints of the antennae in part, and the basal margin of the prothorax, testaceous. Head rather short, somewhat convex; antennae very short. Prothorax about as long as broad, a little wider than the head, much narrowed anteriorly. Elytra moderately long, much wider than the prothorax, narrowly margined, the spaces between the coarse punctures smooth. Anterior tarsi slender.

♂. Narrower, the front of the head, the antennae, and tarsi paler, the legs a little stouter; antennae longer; eyes more convex; anterior tarsi thickened, joint 2 distinctly produced at the apex within, 5 sparsely nigro-setulose beneath, the upper claw longer than the lower one.

Length $2\frac{2}{3}$–3 mm.

Hab. NATAL, Malvern [♂] and Umgeni [♀] (*Dr. Marshall*: vi, vii, 1897).

One pair. Separable from *P. circumcinctus* Redt. and other allied forms by the coarse puncturing of the upper surface, particularly of the head, and the subparallel shape in the two sexes, the elytra entirely infuscate.

4. **Pagurodactylus angustulus**, n. sp.

♂. Elongate, narrow, slightly widened posteriorly, shining, clothed with fine pubescence intermixed with long, soft, erect hairs; aeneo-piceous or brassy-black, the basal joints of the antennae, tibiae, and tarsi sometimes in part, testaceous; the head and prothorax somewhat coarsely and rather closely (except a narrow smooth space down the middle of the disc of the latter in some specimens), the elytra densely, rugosely, punctured. Head about as wide as the prothorax, moderately long, bi-impressed in front and foveate on the vertex; antennae moderately long, rather slender. Prothorax convex, longer than broad, narrowed in front and behind, the lateral margins not prominent. Elytra wider than the prothorax, elongate. Anterior tarsi slightly thickened, joints 3 and 4 (as seen in profile)

acutely produced at the inner apical angle, 5 nigro-setulose beneath, the upper claw longer and a little stouter than the lower one.

♀. Antennae shorter; elytra more widened posteriorly.

Length 2½–3 mm.

Hab. S. Africa, Table Mountain (*Dr. Marshall*), Constantia Nek and Rondebosch (*E. B. Poulton*).

Found in abundance by Dr. Marshall and Prof. Poulton in August 1905. This insect agrees in some respects with the description of *P. donceeli* Pic (1907), type from Port Elizabeth; but the latter is said to have the head long and narrow, the prothorax smooth on the disc, and the body broader than in *P. angustissimus*, a definition that will not apply to *P. angustulus*. *P. donceeli*, moreover, is stated to have the facies of certain species of *Attalus* near *Pecteropus*, instead of that of a narrow *Dasytes*, for which *P. angustulus* might easily be mistaken.

5. Pagurodactylus funereus, n. sp.

♂. Elongate, narrow, shining, clothed with fine greyish pubescence intermixed with long, erect, blackish, bristly hairs; black, the basal joints of the antennae (except joint 1 above) testaceous, the legs piceous; the head and prothorax sparsely, finely, the elytra densely, rugulosely punctate. Head oblong, rather convex, narrower than the prothorax, triangularly depressed between the eyes and bisulcate in front, the eyes somewhat prominent; antennae short, moderately slender. Prothorax as long as broad, convex, narrowed anteriorly, transversely grooved behind the anterior margin, sulcate along the sides posteriorly, and foveate in the centre at the base, the lateral margins reflexed. Elytra long, much broader than the prothorax, a little widened posteriorly, narrowly margined. Anterior tarsi thickened, nigro-setulose beneath, the upper claw long and rather stout, the lower one short, slender, toothed near the base beneath.

♀. Head narrow, the eyes not prominent; elytra longer and more rounded at the sides beyond the middle.

Length (with head) 2⅘–3½ mm.

Hab. S. Africa, Malvern, Natal (*Dr. Marshall, Mus. Cape Town* and *Mus. Durban*: iv, 1897; iv, v, 1898).

Two ♂♂ and one ♀. This insect has the general facies of a small narrow *Dasytes*; but no *Dasytes* has the anterior tarsal claws of ♂ formed as in *P. funereus*, which is certainly congeneric with *P. vitticeps* Gorh., the latter having a shorter prothorax, long antennae in ♂, etc. *P. circumcinctus* has the antennae formed as in *P. funereus*. Compared with

P. (*Attalus*) *lugens* Gorh. the present species is larger, the margins of the prothorax are more reflexed towards the base, and the setae are longer.

6. Pagurodactylus lugens.

♀. *Attalus* (?) *lugens* Gorh., Ann. and Mag. Nat. Hist. (7), vii, p. 357 (1901).

Hab. S. Africa, Salisbury, Rhodesia.

Four specimens seen. A small, narrow, elongate, shining black insect, sparsely clothed with rather long, semierect greyish hairs intermixed with the scattered pubescence; head long, narrow, hollowed down the middle; prothorax longer than broad, very sparsely punctulate; elytra long, narrowly margined, rugulosely punctured; legs and antennae slender. *P. lugens* has somewhat the facies of *P. metallicus* (No. 19), and the anterior tarsi of the ♂ are probably similarly formed.

7. Pagurodactylus circumcinctus.

Dasytes circumcinctus Redt., Reise Novara, ii, p. 107 (1867).

♂. Anterior tarsi slightly thickened, sparsely nigro-setulose beneath, the claws unequal in length, the upper one longer than the other; antennae short; eyes convex.

♀. Anterior tarsi slender, the claws smaller, equal; eyes less prominent; body more elongate, the prothorax less transverse, the elytra much longer and widened to beyond the middle.

Hab. S. Africa, Cape of Good Hope (*type*), Cape Town and Stellenbosch (*Mus. Cape Town*), Wynberg (*Dr. Marshall*), Lion's Head, and Camps Bay (*R. E. Turner*: viii, ix, 1920), Mossel Bay, Table Mountain (*W. Bevins*).

A shining black, nigro-hirsute form, with the mouth-parts, the expanded margins of the elytra, the anterior and intermediate tibiae in part, and sometimes the antennae to near the tip, testaceous; the head and prothorax very sparsely, finely, the elytra rather coarsely, closely punctate. Less elongate and much more shining than *P. angustissimus* Pic, and clothed with intermixed long, black, bristly hairs; the head and prothorax shorter and broader, very sparsely punctate, and not sulcate; the elytra coarsely punctured, and with the expanded outer margin only testaceous. Redtenbacher describes the antennae as testaceous. The type, Dr. Holdhaus informs me, cannot now be found in the Vienna Museum. Found in plenty on Table Mountain by Mr. Bevins.

8. Pagurodactylus suturellus, n. sp.

Attalus suturellus Gorh. in litt.

♀. Elongate, narrow, depressed, shining, sparsely, finely pubescent, the elytra with intermixed, long, semierect, pallid, bristly hairs; nigro-piceous or piceous, the basal joints of the antennae in part, the basal margin or hind angles of the prothorax, and sometimes the lateral margins also, and the sutural and outer margins of the elytra, testaceous or pale testaceous; the head and prothorax sparsely, finely, the elytra rugulosely, punctate. Head narrower than the prothorax, triangularly depressed anteriorly; antennae short; prothorax about as long as broad, narrowed towards the base and apex, hollowed along the sides posteriorly. Elytra elongate, much wider than the prothorax, somewhat rounded at the sides, from a little below the base, depressed along the suture, the margins prominent.

♂. Narrower and less elongate, the eyes a little more convex; anterior tarsi thickened, the upper claw much longer than the lower one; elytra relatively shorter.

Length 2–2$\frac{4}{5}$ mm.

Hab. S. Africa, Salisbury and Sebakwe, Rhodesia, Malvern and Verulam, Natal (*Dr. Marshall*: vii, 1897; viii, 1900, vii, 1910; *Mus. Cape Town; Mus. Durban*).

A common insect in Natal, and apparently undescribed. A very small, narrow, immature-looking form, resembling *P. angustissimus* Pic in colour, with a less elongate, smoother head, a shorter, non-sulcate, smoother prothorax, and more shining, hirsute elytra. The pale sutural stripe is somewhat evanescent. The head is shorter and broader than in *P. lugens* Gorh., which has the entire upper surface black. *P. suturellus* does not belong to *Attalus*, as shown by the anterior tarsal structure of the ♂.

9. Pagurodactylus coronatus.

Anthocomus coronatus Boh., Ins. Caffraria, i, 2, p. 470 (1851).

♂. Anterior tarsi rather slender, joint 5 closely nigro-setulose beneath, the claws subequal in length, slightly longer than those of the other tarsi, the upper claw a little stouter than the lower one; antennae long, slender, filiform.

♀. Anterior tarsi more slender, the claws smaller, equal; antennae short, slightly thickened towards the tip.

Length (including head when extended) 3 mm.

Hab. S. Africa, Limpopo River (*type of Boheman*), mouth of Umkomaas River, Natal (*Dr. Marshall* : ix, 1897).

Three ♂♂ and one ♀ captured by Dr. Marshall agree with Boheman's description. A narrow, shining, piceous, hirsute insect, with an oblong-oval, rather convex, deflexed, testaceo-bivittate head; prominent eyes; pallid, slender antennae; a long, rather narrow prothorax; rugose, flavo-bifasciate elytra (the second fascia apical); and testaceous tarsi. Boheman compares *P. coronatus* with *Anthocomus fasciatus* L., which differs greatly in structure from the present species.

10. **Pagurodactylus translucidus,** n. sp.

♂. Elongate, narrow, depressed, slightly widened posteriorly, shining, somewhat thickly clothed with long, erect hairs; brassy black, the basal margin of the prothorax, and the lateral margin thence to the middle, a transverse, translucid ante-median fascia on the elytra (not reaching the suture), the basal joints of the antennae beneath, and the extreme bases of the tibiae, flavous or testaceous; the entire upper surface coarsely, rather closely punctured. Head narrow, somewhat elongate, flattened anteriorly, the sides of the front raised and cariniform, the eyes prominent; antennae pilose, long, slender, joints 3–6 gradually increasing in length, 6–11 very elongate. Prothorax narrow, longer than broad, grooved along the sides posteriorly. Elytra elongate, much wider than the prothorax. Legs slender, clothed with long hairs; anterior tarsi with joint 5 nigro-setulose and thickened at the tip beneath; claws long, slightly widened in their basal half, those of the anterior pair subequal.

♀. Antennae much shorter; elytra more widened posteriorly, the fascia almost obsolete; anterior tarsal joint 5 slender to tip, the claws smaller, equal.

Length 3¼–3½ mm.

Hab. S. Africa, Mossel Bay, Cape Province (*R. E. Turner* : vii, 1921; iii, 1922).

One pair. Larger than *Dasytophasis* (*Attalus*) *albofasciatus* Gorh. (infra), the entire upper surface coarsely punctured, the head and prothorax broader, the apices of the elytra immaculate. The simple, elongate antennae, the apically-thickened, nigro-setulose terminal joint of the anterior tarsi, and the longer tarsal claws, separate *P. translucidus*, ♂, from the same sex of *Dasytophasis capicola* and *D. albofasciatus*. The anterior tarsal claws are almost

equal in length in the ♂ of the present species, which differs in this respect from the typical members of the genus.

11. Pagurodactylus flavocinctus, n. sp.

♀. Moderately elongate, widened posteriorly, shining, somewhat thickly clothed with long decumbent pubescence, intermixed on the head and prothorax with erect hairs, and on the elytra with short adpressed pubescence; brassy-black, the antennal joints 1–4, the basal, apical, and lateral margins (except towards the anterior angles) of the prothorax, knees, and bases of the tarsi testaceous, the elytra with a sharply defined, curved, transverse, ante-median fascia (not reaching the suture, but extending to the outer margin); the head and prothorax closely, conspicuously, the elytra coarsely, rugosely punctured. Head much narrower than the prothorax; antennae short, joints 8–10 transverse. Prothorax nearly as long as broad, very convex, narrowed towards the base and apex. Elytra moderately long, much broader than the prothorax, rounded at the sides posteriorly. Legs hairy.

Length $2\frac{1}{2}$–$2\frac{3}{5}$ mm.

Hab. S. Africa, Mossel Bay, Cape Province (*R. E. Turner*: iii, 1922).

Two ♀♀, recently sent with a ♀ of *P. translucidus* from the same locality. Smaller and less elongate than the last-named insect; the head and prothorax more finely punctured, the latter shorter and more convex; the elytra not so long, more closely, rugosely punctured, and with a sharply defined, non-evanescent flavous fascia.

12. Pagurodactylus flavosignatus, n. sp.

♂. Elongate, narrow, depressed, slightly widened posteriorly, shining, sparsely clothed with pallid pubescence intermixed with long, erect, blackish, bristly hairs; black, the labrum, oral organs, basal joints of the antennae, basal margin of the prothorax, tip of the abdomen, tarsi, and tibiae in part, testaceous, the elytra with a common, transverse fascia below the base (interrupted at the suture) and a transverse spot on the disc of each towards the apex, flavous; the head and prothorax sparsely, rather strongly punctured, the elytra with scattered, intermixed coarse and fine punctures, the latter becoming crowded on the pallid markings. Head rather long, nearly as wide as the prothorax, canaliculate on the vertex, the eyes prominent; antennae long, rather stout, joints 4–10 triangular,

longer than broad. Prothorax longer than broad, narrowed towards base and apex. Elytra long, much wider then the prothorax, depressed below the base, rounded at the apex, the humeri swollen. Anterior tarsi moderately thickened, joints 1 and 2 subequal in length, 4 and 5 nigro-setulose beneath, the upper claw longer and stouter than the lower one.

Length (with head extended) $3\frac{1}{5}$ mm.

Hab. S. Africa, Cape Town (*Mus. Cape Town*: xii, 1887).

Two males. Larger and more robust than *Dasytophasis* (*Attalus*) *albofasciatus* Gorh.; the head less elongate, and strongly punctured; the antennae long and rather stout; the ante-median fascia of the elytra interrupted at the suture, the apical fascia replaced by a transverse subapical spot. The present species has the general facies of an elongate, spotted *Anthicus*.

13. **Pagurodactylus cephalotes**, n. sp. (Fig. 2.)

♂. Elongate, shining, clothed with pallid decumbent pubescence intermixed with very long, black, erect, bristly hairs; testaceous or rufo-testaceous, the head (except at the base and in front), the outer joints of the antennae, the elytra with a basal and a post-median fascia, connected along the suture, and sometimes a small spot on the disc near the apex, and the metasternum, to a variable extent, black, the elytral markings in some specimens evanescent. Head extremely large and broad, nearly twice the length of the prothorax, arcuately swollen on each side behind the eyes and obliquely narrowed thence to the base, transversely bi-impressed in front and longitudinally excavate at the middle of the vertex, coarsely, rugosely punctured, smoother in front and at the base; eyes convex; antennae short, stout, the joints comparatively broad, 6–10 strongly transverse. Prothorax small, strongly transverse, much narrower than the head or elytra, obliquely narrowed behind, very sparsely, minutely punctate, grooved behind the anterior margin, the lateral margins reflexed. Elytra long, subparallel in their basal half, rounded at the tip; closely, rather coarsely punctate, with coarser setigerous punctures intermixed. Anterior tarsi stout, sparsely nigro-setulose beneath, joint 2 produced into a strong tooth at the apex within; the upper claw long, simple, the lower one shorter and more slender, angulate near the base, similar to those of the other tarsi.

♀. Head entirely or to near apex, the antennae (except the basal joints beneath), the prothorax with an interrupted transverse space

before the middle in one specimen, the elytra (except at the tip), and the bases of the femora, black; head short, small, coarsely, rugosely punctured, bi-impressed in front; antennae much more slender; elytra widened posteriorly; legs more slender, anterior tarsi simple, the claws equal.

Length 3–3½ mm.

Hab. S. Africa, Salisbury (*Dr. Marshall*: ♂♀; *J. O'Neil*, in *Mus. Cape Town*: ♂) and Hope Fountain, Rhodesia (*Neville Jones*: ♂); Estcourt, Natal (*Dr. Marshall*: ♂♀).

Seven ♂♂ and two ♀♀, the former varying in the development of the black markings on the head and elytra, the ♀♀ with a small head and the elytra black to near the tip. This is one of several closely allied S. African forms, the females of which are scarcely separable one from another.

14. Pagurodactylus marginipennis.

?*Attalus marginipennis* Ab. de Perrin, Rev. d'Ent., xix, pp. 164, 175 (♀) (1900).

Type, ♀. Prothorax with an oblong black streak on the disc anteriorly; elytra black, the outer margins narrowly, and the apex broadly, testaceous.

Var. ♂. Very like *P. cephalotes*, more thickly pubescent, the intermixed blackish hairs shorter, softer, and more numerous; the elytra with a common, broad nigro-piceous patch extending from the base to far beyond the middle, the dark space hollowed at the sides anteriorly (appearing dilated at the base and apex). Head less developed, about as wide as the prothorax, densely, moderately coarsely punctate, unimpressed on the vertex; antennae short, rather slender, as in *P. cephalotes*, ♀. Prothorax relatively broader, somewhat closely punctured. Elytra more densely and not so coarsely punctate. Anterior tarsi and claws as in *P. cephalotes*.

♀. Head small; antennae shorter; anterior tarsi slender, simple.

Length 2½–3½ mm.

Hab. S. Africa, Makapan, N.E. Transvaal (*type of Abeille de Perrin*: ♀), Bothaville, Orange Free State (*Dr. Brauns, in Mus. Cape Town*: 1, iii, 1899: ♂♀).

The description of the sexual characters, etc., is taken from two ♂♂ and one ♀ from Bothaville; the latter differs from the type of *P.* (*Attalus*) *marginipennis*, Ab. (lent me by Dr. Péringuey), in having the infuscate portion of the elytra less extended and the median streak on the prothorax

obsolete. Another ♀, from Pretoria (*Bucknill*), with the dark markings on the elytra reduced to a small humeral spot and an incomplete post-median fascia, may belong to the same species (?). Till males of *P. marginipennis* are obtained from the type-locality, the identification of that sex of the species must remain in doubt. A Bothaville ♂ has been retained for the British Museum collection.

15. **Pagurodactylus nigrosetosus,** n. sp.

♂. Very like *P. cephalotes*; the elytra testaceous, the puncturing sparser and a little stronger, the black setae very long; the head not wider than the prothorax, obliquely narrowed from the eyes backward, the cavity on the vertex broad and very deep, the puncturing not so coarse; the antennae slender (as in ♀ *P. cephalotes*); the elytral puncturing coarse and rather diffuse; the anterior tarsi similarly formed.

Length 2½–3½ mm.

Hab. S. Africa, Frere, Natal (*Dr. Marshall*: iii, 1896).

Four males, varying in the development of the head, the latter without trace of the rounded tumid space behind each eye, and the cavity on the vertex broader and deeper.

16. **Pagurodactylus debilis,** n. sp.

♂. Moderately elongate, shining, clothed with fine pubescence intermixed with erect, black, bristly hairs; testaceous, the head in part, the outer joints of the antennae, a patch on the prothorax, a narrow, basally-widened, sutural stripe on the elytra extending from the base to near the apex (sometimes dilated posteriorly into a large patch or entirely obsolete), and metasternum, black or piceous; the head and elytra closely, the prothorax very sparsely, minutely, punctate. Head barely as wide as the prothorax, smoother in front, feebly foveate on the vertex; antennae a little longer and stouter than in ♀. Prothorax transverse, rounded at the sides. Elytra subparallel. Anterior tarsi thickened, joint 2 dentate at the tip within, the upper claw longer and stouter than the lower one.

♀. Head small; antennal joints 6–10 transverse; elytra widened posteriorly; anterior tarsi slender.

Var. Elytra piceous, with the sides and apex only testaceous (♀).

Length 2½–nearly 3 mm.

Hab. S. Africa, Howick, Natal (*J. P. Cregoe*, in *Mus. Brit.* and *Mus. Cape Town*).

Eight ♂♂, eight ♀♀. Whether this form should be considered more than a race of *P. nigrosetosus* is doubtful:

the puncturing of the elytra is closer and not so coarse; the setae are finer; and the ♂ wants the very deep excavations on the vertex; The prothorax and elytral markings are more or less evanescent or variable; the dark variety (♀) from the same locality has the elytra coloured as in the same sex of *P. cephalotes* and *P. marginipennis*, from which it is separable by its smaller size and shorter antennae.

17. **Pagurodactylus angulatus**, n. sp.

♂. Elongate, narrow, shining, clothed with fine pubescence intermixed with long erect hairs; the head (except in front), prothorax (the basal margin, and the lateral margins thence to the middle excepted), two fasciae on the elytra (basal and post-median), which are connected along the suture, a transverse subapical spot, and the metasternum, piceous, the rest of the body, antennae (except joint 1 above), and legs testaceous; the prothorax densely, finely, the head and elytra more coarsely, punctured. Head rather large and convex, as wide as the prothorax, obliquely narrowed behind the eyes, the latter prominent; antennae short, rather stout. Prothorax nearly as long as broad, angularly dilated at a little before the middle. Elytra wider than the prothorax, subparallel. Anterior tarsi thickened, joints 2 and 5 nigro-setulose beneath, the upper claw a little longer and stouter than the lower one.

♀. Head smaller, short; antennae shorter, darker and more slender; elytra widened posteriorly, testaceous, with a broad, basally and apically dilated, piceous sutural stripe extending from the base to near the tip, the dilated apical portion rhombiform.

Length 2½ mm.

Hab. S. Africa, Piquetberg (vi, 1886: ♂), Strand (vii, 1887: ♀) (*Mus. Cape Town*).

One pair. A diminutive form of *P. cephalotes*, with a laterally-angulate, densely punctured, testaceo-marginate, piceous prothorax; the elytra fusco-bifasciate in ♂, and with a basally and apically dilated dark sutural stripe in ♀. The ♀ has been placed in the British Museum.

18. **Pagurodactylus fenestratus**, n. sp.

♂. Moderately elongate, narrow, shining, clothed with scattered pallid pubescence intermixed with long, erect, blackish, bristly hairs; testaceous, the antennae usually with joints 7–9, 1 at the base above, and 11 at the tip, a transverse patch on the vertex, a spot on the prothorax, two fasciae on the elytra (basal and submedian, the latter broad, neither reaching the lower outer margin),

and a transverse curved subapical spot (sometimes wanting), these markings connected along the suture, infuscate or black; the head and prothorax sparsely, finely, the elytra closely, strongly, rugulosely punctate. Head (with the convex eyes) about as wide as the prothorax, canaliculate on the vertex; antennae moderately long, slender. Prothorax convex, nearly as long as broad, narrowed in front and behind, sharply margined. Elytra broader than the prothorax, somewhat rounded at the sides from a little below the base and feebly dilated posteriorly, the margins prominent. Anterior tarsi slightly thickened, joint 5 nigro-setulose beneath, the upper claw a little longer and stouter than the lower one.

♀. Head narrower than the prothorax, the antennae shorter and paler; elytra much widened posteriorly.

Var. Elytra infuscate, the lateral margins and apex only testaceous (♂).

Length $2\frac{1}{10}$–$3\frac{1}{4}$ mm.

Hab. S. Africa, Mossel Bay, Cape Province (*R. E. Turner*: iv, 1921, iii, 1922).

Seventeen examples, including eight ♂♂. A small, shining, setose, testaceous insect, the elytra with dark fasciae, which are coalescent along the suture and sometimes united into a large patch, leaving the margins and apex only pale. The ♀ is extremely like a small *Attalus;* the ♂ has the anterior tarsal structure of *Pagurodactylus.*

19. **Pagurodactylus metallicus,** n. sp.

♀. Elongate, narrow, slender, widened posteriorly, subopaque, very finely, sparsely pubescent; caeruleous, the antennae (the partly testaceous basal joints excepted) and legs piceous; the entire upper surface extremely finely alutaceous (appearing dull and sericeous), the elytra with very fine scattered punctures. Head oblong, rather narrow, triangularly depressed anteriorly, the eyes not prominent; antennae rather short, slender. Prothorax much longer than broad, a little narrowed anteriorly, hollowed along the sides posteriorly and also in the middle at the base. Elytra elongate, wider than the prothorax, narrowly margined, rounded and convex at the tip. Legs long and slender; anterior tarsi not thickened; tarsal claws small, equal.

♂. Anterior tarsi somewhat thickened, the upper claw longer and stouter than the lower one; head broader, the eyes convex; antennae slightly longer.

Length $2\frac{1}{2}$–3 mm.

Hab. S. Africa, Malvern, Natal (*Mus. Brit.*; *Mus. Durban*: viii, 1897, vii, 1901), Sebakwe, Rhodesia (*Mus. Cape Town*).

Nine specimens seen, including four ♂♂ and a pair "in copula." A slender, caeruleous, rather smooth, subopaque insect, not unlike *P. lugens* Gorh. in size and shape, with inconspicuously punctured longer elytra, the head similarly triangularly hollowed anteriorly. There are various similarly coloured Dasytids in Japan and New Zealand.

20. Pagurodactylus disjunctus.

Anthocomus disjunctus Boh., Ins. Caffraria, i, 2, p. 471 (♀) (1851).

Pagurodactylus apicalis Pic, L'Echange, xx, p. 66 (♂♀) (1904).

♂. Anterior tarsi thickened, sparsely nigro-setulose beneath, the upper claw very long, much longer and stouter than the lower one, which is subdentate near the base; antennae moderately long, rather slender.

♀. Anterior tarsi slender, the claws small, equal, similar to the others; elytra more widened posteriorly; antennae a little shorter.

Hab. S. Africa, River Limpopo (*type of Boheman*), Mouth of Umkomaas River and Malvern, Natal (*type of Pic*; *Dr. Marshall*: ix, x, 1897), Zululand (*ex coll. Fry*).

Not rare in Natal. An elongate, subopaque, nigro-piceous insect, with the head in front, and along the middle, and an apical patch on the elytra (extending a short distance forward along the suture), rufotestaceous; the antennae and the anterior legs in part testaceous; the puncturing of the upper surface extremely fine and close; the vestiture fine and sericeous, without longer hairs intermixed; the prothorax as long as broad, feebly canaliculate anteriorly; the elytra narrowly margined. Boheman, whose type has been lent me by Dr. Sjöstedt, does not allude to the structure of the tarsal claws, which are described by Pic. The antennae are comparatively short and slender, and very different from those of *P. vitticeps* Gorh.

21. Pagurodactylus angustissimus.

♀. *Pagurodactylus* (?) *angustissimus* Pic, L'Echange, xxiii, p. 131 (1907).

♂. Anterior tarsi rather stout, nigro-setulose beneath, the claws long, unequal in length, the upper one longer and stouter than the lower one; antennae very little longer than in ♀.

♀. Anterior tarsi slender, the claws shorter, equal, similar to those of the other tarsi.

Hab. S. Africa, Cape Town (*F. Purcell*), Port Elizabeth (*Mus. Cape Town* and *type of Pic*), Lion's Head, Rapenburg, and Camps Bay (*R. E. Turner*: viii–x, 1920), Table Mountain (*W. Bevins*).

A very elongate, narrow, posteriorly-widened, depressed, sparsely pubescent, subopaque insect; black, with the sutural and outer margins of the elytra, the basal joints of the antennae in part, the anterior and intermediate tibiae, and sometimes the basal margin or hind angles of the prothorax, testaceous; the head long, narrow, subrostrate, sulcate down the middle, and finely punctured; the prothorax long, narrow, deeply trisulcate, closely punctate; the elytra densely, finely punctulate, with prominent outer margins, and the epipleura reaching to the base of the abdomen. Apparently a common species at the Cape.

22. **Pagurodactylus rostralis,** n. sp.

♀. Very elongate, depressed, narrow, widening to near the apex, shining, finely pubescent, with longer bristly hairs intermixed; black with a bluish or green lustre in certain lights, the mandibles and a patch at the apex of the elytra testaceous; the head and prothorax very sparsely, finely, the elytra rugulosely punctured. Head strongly deflexed, very long and narrow, rostrate, sulcate between the eyes, the latter rather small and inserted at about the middle of the sides; antennae short, joints 1 and 2 short, equal. Prothorax longer than broad, narrowed anteriorly, sulcate down the middle (the groove terminating in a transverse depression before the base) and with a deep marginal furrow extending down the basal half. Elytra elongate, much wider than the prothorax, arcuately dilated posteriorly and with the margins explanate from about the middle to near the apex, the epipleura short.

♂. Anterior tarsi simple, slightly thickened, joints 3 and 4 short, the upper claw very long, the lower claw shorter and more slender and with a narrow free membranous lobe beneath; terminal ventral segment with a very deep fovea in the middle behind.

Length (excl. head) 2½–3 mm.

Hab. S. Africa, Howick, Natal (*J. T. Cregoe; Mus. Cape Town*), Pretoria (*L. M. Bucknill*).

Nine examples seen. This species, owing to its long, narrow, rostrate head (suggestive of that of the American genus *Tanaops*), should perhaps be removed to a separate genus; but it is connected with the typical forms by *P. angustissimus* and *P. metallicus*. The present insect has the general facies of a Malachiid.

23. Pagurodactylus masaicus, n. sp.

♂. More elongate and larger than *P. rostralis*; nigro-aeneous or black, the testaceous apical spot on the elytra extending forward at the sides to about the middle and also for a short distance up the suture; the head and prothorax less shining, densely alutaceous, and sparsely, minutely punctate, the head equally elongate, the prothorax relatively longer, the elytral margins in ♀ more broadly explanate in their apical half, the anterior tarsi of ♂ as in *P. rostralis*.

Length (with head raised and extended forward) 3½–4 mm. (♂♀).

Hab. E. Africa, Mau, Masai Reserve (*Capt. A. O. Luckman*: 7. i and 4. iii, 1914).

One ♂, two ♀♀. A form of *P. rostralis* requiring a distinctive name.

Dasytophasis, n. gen.

Dasytophasis Péringuey, in litt.

Very near *Pagurodactylus* Gorh. (*lugens, angustulus*, etc.); anterior tarsi slender in both sexes, narrow, joints 1 and 2 longer than 3, the claws small, not elongated or unequal in ♂, feebly subangularly widened near the base; antennal joints 5 and 6 or 5 only dentiform in ♂, simple in ♀; elytral sculpture unequal; lateral vesicles wanting.

Type, *D. capicola*.

This genus was named long ago by Dr. Péringuey, but not described, though both sexes were found by Raffray near Cape Town, and specimens given by him to the Cape Town Museum. It cannot be included under *Pagurodactylus* as defined by Gorham.

The ♂ of *D. capicola* has joints 7–11 of the antennae elongated, and 5 and 6 together forming a grasping-organ; that of *D.* (*Attalus*) *albofasciatus* Gorh., which must be included in the same genus, has these organs short in both sexes, and the fifth only dentiform.

1. Dasytophasis capicola, n. sp.

Dasytophasis capicola Péringuey, in litt.

♂. Elongate, very narrow, slightly widened posteriorly, clothed with fine scattered pubescence intermixed with very long erect hairs, these latter extending to the tibiae also, the antennae (in fresh specimens) pilose; brilliant brassy-black or aeneo-piceous, joints 1–5 (or 1 and 2 only) in part testaceous, the legs sometimes fuscous; the head and prothorax very sparsely punctured, the latter rugulose at the sides; the elytra very coarsely closely punctate from a little below the base to just beyond the middle, the rest of their surface much smoother. Head about as long as the prothorax and (with the eyes) of the same width, foveate or canaliculate on the vertex; antennae (fig. 3) very long, slender, joint 2 small, short, 3 and 4 a little longer, 5 crescentiform, the inner horn of the crescent produced into a long curved tooth, 6 at the apex angularly extended inwards into a still longer, almost straight tooth, 7–11 very elongate. Prothorax as long as or a little longer than broad, narrowed towards the base and apex, convex, the basal margin reflexed. Elytra very long, much wider than the prothorax, rounded at the apex; epipleura very short, without dividing ridge. Terminal ventral segment excavate down the middle.

♀. Antennae short, slender, joints 6–10 subequal in length.

Length 2–3 mm.

Hab. S. Africa, Cape Town and Stellenbosch (*Raffray and Purcell, in Mus. Cape Town*), Camps Bay [type] (*Dr. Marshall*: viii, 1905; *R. E. Turner*: ix, x, 1920), Lion's Head, Ceres (*R. E. Turner*: viii, x, 1920).

Numerous examples seen, including six males varying considerably in size. The ♀ is extremely like the same sex of *Pagurodactylus* (*Attalus*) *lugens* Gorh., from which it may be separated by the unequally punctured elytra and the relatively longer basal joint of the anterior tarsi.

2. Dasytophasis albofasciatus.

♀. *Attalus* (*?*) *albofasciatus* Gorh., Ann. and Mag. Nat. Hist. (5) vii, p. 356 (1901).

♂. Antennae moderately long, slender, joint 5 produced into a curved tooth at the apex within; anterior tarsi slender, simple, the claws small, equal.

♀. Antennae shorter, simple.

Hab. S. Africa, Malvern, Natal.

One ♂, three ♀♀ seen. The ♂ is labelled *A. albofasciatus* in Gorham's handwriting, and he evidently did not observe the dentiform fifth antennal joint, this joint being quite simple in ♀. This species has the elytra fasciate as in *Pagurodactylus* (*Anthocomus*) *coronatus* Boh., differing from that insect in its more slender build and smaller size, the narrow, sulcate, less convex head, the peculiar form of the ♂-antennae, the smoother prothorax, and the shining, strongly punctured elytra, the apical portion of which is much smoother. The tarsal claws are small in the two sexes. The head is long and narrow, as in *P. angustissimus* Pic. The upper surface of the body and the outer edges of the tibiae are set with very long, erect or projecting hairs.

Dasytes.

Dasytes Paykull, Fauna Suecica, ii, p. 156 (1798).

The S. African "*Dasytes*" before me include representatives of three or four genera or subgenera, of two of which one sex only is at present available for examination. It is therefore advisable to leave the thirteen species here enumerated under the one genus *Dasytes* till more material is obtained of some of them.* *D. oncili* Pic, and its allies have the anterior tibiae denticulate externally, much as in the American genus *Trichochrous* Motsch. (= *Pristoscelis* Lec.), these insects having a hairy body like that of *Henicopus* Steph.; *D. costatipennis* Pic, and *D. cribricollis*, have the facies of a *Psilothrix* Redt., and *D. luteopubens* Pic, that of an American *Listrus* Lec. *D. stellatus* will have to be removed to a separate genus when the two sexes are found. *D. caeruleus*, *viridis*, and *rufipes* Thunb. (1821), cannot be identified from the imperfect diagnoses.

1 (10). Tarsal claws with a membranous expansion or appendage reaching to near the apex of the claws.

2 (3). Anterior tibiae more or less denticulate towards the apex externally; body black or submetallic, hirsute, the legs and antennae in part testaceous . Species 1–4.

3 (2). Anterior tibiae narrow, not denticulate.

* It may be noted here that most of, if not all, the numerous described Australian insects referred to *Dasytes* do not belong to the genus, even in the wide sense adopted by European writers.

4 (9). Upper surface with intermixed long, erect or suberect hairs.
5 (8). Elytra with intermixed seriately-arranged smooth tubercles or granules.
6 (7). Species large, brilliantly metallic, resembling *Psilothrix*; legs and antennae metallic or black . . . . Species 5–8.
7 (6). Species small, brassy, legs and antennae in great part testaceous . . . . Species 9.
8 (5). Elytra uniformly rugulose; species small, narrow . . . . . Species 10–13.
9 (4). Upper surface uniformly pubescent, opaque; sculpture very fine, alutaceous; species small, narrow, resembling *Dasytiscus* . . . . . Species 14.
10 (1). Tarsal claws without membranous appendage; species very small, convex, black, shining, elytra bifasciate and stellato-punctate . . . . . Species 15.

1. Dasytes oneili.

Dasytes oneili Pic, L'Echange, xxvii, p. 151 (1907).

♂. Antennae short, very little longer than in ♀, the elytra narrower than in that sex and subparallel in their basal third.

Hab. S. Africa, Bulawayo (*type of Pic; Mus. Cape Town*), Salisbury, S. Rhodesia (*Dr. Marshall*: iv, 1896; iv, 1906); Pretoria (*H. P. Thomasset*) and Sterkfontein, Transvaal (*L. M. Bucknill*).

Found in abundance by Dr. Marshall at Salisbury, on heads of grass. This is one of four extremely closely allied hairy African forms superficially resembling a small *Henicopus*, and mainly distinguishable from the rest by its rather strongly punctured elytra and shining surface. The punctures on the prothorax are coarse and widely scattered. The tibiae and tarsi, and the antennae in great part, are testaceous in all these insects.

2. Dasytes rhodesianus, n. sp.

Moderately elongate, shining, clothed with fine cinereous pubescence intermixed with long, erect, blackish bristly hairs; brassy-black, the elytra with a greenish tinge, the antennae (except at the tip), the femora in part, tibiae, and tarsi rufo-testaceous. Head narrower than the prothorax, very sparsely, finely punctate, deeply

bisulcate anteriorly; antennae short in ♂, still shorter in ♀, thickened outwards, joints 7–10 transverse. Prothorax transverse, convex, rounded at the sides, more or less depressed or sulcate down the middle; sparsely, coarsely punctate, with finer punctures intermixed, the interspaces polished. Elytra not or very little broader than the prothorax, slightly widened posteriorly, conjointly rounded at the apex; densely, very finely punctate, and with scattered, seriately-arranged, smooth granules extending throughout their length, the granules more distinct in some specimens than in others. Anterior tibiae sharply denticulate towards the apex externally.

Length $3\frac{1}{10}$–$4\frac{1}{2}$ mm. (♂♀.)

Hab. S. Africa, Mwengwa, N.W. Rhodesia (*H. E. Dollman*: 2. iv, 1914); Pretoria, Transvaal (*L. M. Bucknill*).

Found in plenty at Mwengwa, and sent singly from Pretoria with a specimen of *D. oneili* Pic, compared with which it is a smaller and narrower insect, and has the elytra densely, very finely punctured and pubescent, thus appearing subopaque. Compared with *D. coriaceus* Gorh., the Rhodesian insect is a little narrower, and has less acuminate more densely punctured elytra.

3. Dasytes nyassanus.

Dasytes nyassanus Pic, L'Echange, xxvii, p. 151 (1911).

Hab. E. Africa, Nyasa (*ex coll. Fry*: ♂♀).

Four specimens from Nyasa, the ♂ imperfect, are probably referable to this species. They are a little smaller and narrower than *D. oneili*, and have the prothorax not quite so sparsely punctured.

4. Dasytes coriaceus.

♀. *Anthocomus* (?) *coriaceus* Gorh., Proc. Zool. Soc. Lond. 1905, ii, p. 275.

Hab. S. Africa, Bothaville, Orange Free State (*Dr. Brauns, in Mus. Cape Town*).

The type of *A. coriaceus* Gorh., ♀, labelled by the author, has been lent me for examination by Dr. Péringuey. It is obvious that the generic name "*Anthocomus*" must have been used in mistake for *Dasytes*, as no *Anthocomus* has the body clothed with very long hairs, or possesses a long membranous appendage to the tarsal claws, as described by Gorham. He omitted, however, to note the asperate, externally denticulate tibiae, this being particularly conspicuous on the anterior pair, the denticles at the apex of

which are clustered together and form an angular prominence at the outer angle. The puncturing of the prothorax is very sparse and coarse, that of the elytra close and fine, with scattered, seriately-arranged, smooth granules intermixed. The tibiae and tarsi, and the antennae, except towards the apex and at the base, are rufo-testaceous. *D. coriaceus* is a small form of *D. oneili* Pic, with the elytra more finely punctured, and in the ♀ more acuminate (or less rounded) at the apex.

5. Dasytes costatipennis.

♀. *Dasytes costatipennis* Pic, Bull. Soc. Ent. Fr., 1910, pp. 53, 54.

"Latus, deplanatus, paulo nitidus, viridescens, supra viridis aut caerulco viridescens; thorace alutacco, mediocriter punctato; elytra costatis, rugulose punctatis, late explanatis.—Long. 4·5–5·5 mm." [Pic.]

♂. Antennae slender, rather long, extending beyond the hind angles of the prothorax; anterior and intermediate tibiae hollowed towards the apex within, and slightly widened thence to the apex; posterior femora strongly, the other femora more feebly, incrassate.

♀. Antennae shorter; tibiae simple; femora more slender.

Hab. S. Africa (*type of Pic*), Clanwilliam, Mooresburg (*Mus. Cape Town*), Malmesbury (*ex coll. Fry*).

Six specimens (4 ♂♂, 2 ♀♀) before me agree fairly well with Pic's diagnosis. They have broadly explanate, feebly costate elytra, the costae each bearing a row of scattered, smooth granules; the prothorax alutaceous and sparsely punctured; the body clothed with long blackish hairs. This species or the following may be synonymous with the S. African *D. caeruleus* or *D. viridis* Thunb. (1821), the diagnoses of which are useless for the purposes of identification. The latter are not referred to by Pic and are both omitted from the "Munich Catalogue."

6. Dasytes cribricollis, n. sp.

♂. Elongate, rather broad, a little widened posteriorly, moderately shining, clothed with a fine scattered greyish pubescence abundantly intermixed with long, blackish, erect, bristly hairs; bluish-green, the antennae and tarsi black; the head and prothorax alutaceous, and closely, strongly punctured, the elytra densely, rather strongly, rugulosely punctate, and with a few, scattered, subseriately-arranged, smooth granules. Head short, longitudinally impressed on each

side anteriorly; antennae short, not reaching beyond the hind angles of the prothorax, slender, subserrate, the apical joint acuminate. Prothorax convex, strongly transverse, rounded at the sides, the margins rather prominent. Elytra wider than the prothorax, subparallel at the base, the margins moderately expanded thence to near the apex. Tibiae straight. Posterior femora very little thicker than the others. Tarsal claws equal, the membranous expansion beneath reaching to near the tip.

Length 4½ mm.

Hab. S. Africa, Oudtshoorn, Cape Colony (*Dr. Brauns, in Mus. Cape Town*).

One male. Smaller and less elongate than *D. costatipennis* Pic, the elytra with less expanded margins, the costae scarcely traceable and the smooth granules almost obsolete, the prothorax closely, coarsely punctate, the ♂ with much shorter antennae, straight tibiae, and feebly incrassate posterior femora. This insect has the general facies of a *Psilothrix*.

7. Dasytes rubrocupreus.

Dasytes rubrocupreus Pic, Bull. Soc. Ent. Fr., 1910, pp. 53, 54.

"Satis latus, subdepressus, nitidus, nigro-viridescens, supra plus minusve rubro-cupreus; thorace alutaceo, sparse punctato; elytris ruguloso-punctatis, granulatis, satis explanatis.—Long. 4–5 mm." [Pic.]

♂. Antennae short, scarcely longer than in ♀; posterior femora moderately incrassate.

Hab. S. Africa, Caledon (*Dr. Péringuey, in Mus. Cape Town*), Caffraria (*type of Pic*).

Dr. Péringuey has sent me a long series of this species for examination. The colour is somewhat variable, especially of the under surface, but most of the specimens are brilliant cupreous above. Compared with *D. costatipennis*, it is a shorter and more convex insect; the antennae are short in both sexes; the prothorax is more narrowly margined; the elytra have less prominent humeri, the costae almost obsolete, and the margins much less dilated; and the tibiae are simple in both sexes.

8. Dasytes coriaceipennis.

Dasytes coriaceipennis Pic, Bull. Soc. Ent. Fr., 1910, pp. 53, 54.

"Elongatus, subdepressus, nigro-caeruleus, supra caerulescens; thorace crebre punctato; elytris coriaceis, mediocre explanatis.—Long. 6–6·3 mm." [Pic.]

♂. Antennae a little longer and legs stouter than in ♀, the femora subequal.

Hab. S. Africa, Stellenbosch and Tulbagh (*Mus. Cape Town*), Ceres, Cape Province (*R. E. Turner*: xi, 1920), Cape of Good Hope (*type of Pic*).

Narrower and more rugose than *D. costatipennis;* the interspaces on the disc of the prothorax smooth and shining; the elytra parallel, depressed along the suture, the seriately-arranged tubercles more prominent and more numerous. The six specimens in the Cape Town Museum are nigro-caeruleous above, those from Ceres brassy. The anterior tibiae and tarsi are sometimes wholly or in part testaceous.

9. Dasytes capensis.

Dasytes capensis Pic, L'Echange, xxiii, p. 133 (1907).

Hab. S. Africa, Dunbrody (*Mus. Cape Town*).

A specimen from Dunbrody in the Cape Town Museum is perhaps referable to this species. It is less elongate and much smaller (length 2½ mm.) than *D. oneili* Pic, brassy in colour, with the legs and antennae more slender and almost entirely testaceous, the elytra with scattered, smooth, seriately-arranged granules intermixed with the rugulose sculpture, the erect hairs very long. *D. rufipes* Thunb. may be an ally of this insect; the diagnosis is as follows—"Caeruleo-aeneus pedibus rufis. Magnitudine *D. nigri* hirtus, violaceo-viridis, pedibus omnibus et totis rufis."

10. Dasytes parallelus, n. sp.

♂. Elongate, somewhat robust, shining, clothed with greyish pubescence intermixed with erect, darker, bristly hairs; brassy-black, the tibiae and tarsi in great part testaceous, the antennae and palpi black; the entire upper surface densely, finely punctured. Head narrower than the prothorax, bisulcate anteriorly, the eyes rather large; antennae moderately long, comparatively stout, a little thickened outwards, joints 7–10 longer than broad. Prothorax broader than long, sinuously narrowed anteriorly, constricted before the apex, and shallowly sulcate down the middle. Elytra long, broader than the prothorax, parallel, with indications of shallow impressed lines on the disc. Legs long, not very slender.

Length 4 mm.

Hab. S. Africa, Table Mountain (*W. Bevins*).

One example. Larger and more robust than *D. opacus* and its allies, the tibiae and tarsi in part testaceous, the elytra parallel. Not unlike the European *D. flavipes* Oliv. This is one of three *Dasytes* found by Mr. Bevins on Table Mountain, and sent to the British Museum in 1906.

11. **Dasytes turneri,** n. sp.

Elongate, narrow, moderately shining, clothed with fine pubescence intermixed with long, semierect, soft hairs; brassy-black, sometimes with a faint cupreous tinge, the antennae, palpi, and legs black; alutaceous, the head and prothorax extremely finely, closely punctate, the elytra densely, transversely, rugulosely punctured. Head narrower than the prothorax; antennae (♂) elongate, rather stout, joints 3 and 4 longer than 2, 6–10 much longer than broad, (♀) shorter and less thickened, joints 3 and 4 slender. Prothorax slightly broader than long, subquadrate, narrowed anteriorly. Elytra elongate, much wider than the prothorax, parallel to beyond the middle, somewhat acuminate at the apex, more strongly so in ♀, the epipleura wanting. Legs slender; tarsal claws with a membranous expansion beneath extending to beyond the middle.

Length 2½–3 mm.

Hab. S. Africa, Ceres [type] (*R. Turner*: xi, 1920: ♂♀), Cape Town (*Mus. Cape Town*), Wynberg (*Dr. Marshall*: xi, 1904: ♀).

Seven specimens, the ♂♂ somewhat injured, the two ♀♀ from Wynberg apparently belonging to the same species.

12. **Dasytes thunbergi,** n. sp.

Extremely like *D. turneri*, but with the upper surface a little smoother and more shining, black, with a greenish lustre; the prothorax rather uneven, somewhat constricted before the apex, thus appearing more narrowed anteriorly; the antennae of ♂ rather stout, shorter, and with joints 6–10 as broad as long, those of ♀ still shorter, and with joints 6–10 transverse; the elytra parallel in ♂, widening to near the apex in ♀.

Length 2½–3¾ mm.

Hab. S. Africa, Cape Town, Stellenbosch, and Grahamstown (*Mus. Cape Town*), Table Mountain (*W. Bevins*).

A long series, ♀♀ predominating. More shining than the insect here referred to *D. opacus* Thumb., the antennae of the ♂ shorter and stouter.

13. Dasytes opacus.

? *Dasytes opacus* Thunb., Nova Acta Soc. Sci. Upsal., viii, p. 174 (1821).

"*D. opacus*: cinereo-olivaceus, subtus niger. Pediculi magnitudine; supra obscurus, olivaceus seu cinereo-virescens; subtus ater, nitidus. Elytra flexilia." [Thunberg.]

♂. Elongate, narrow, depressed, subopaque, thickly clothed with fine greyish pubescence intermixed with rather long, semierect hairs; brassy-black, the head and prothorax dull, alutaceous, densely, finely punctured, the elytra finely rugulosely punctate. Head bisulcate anteriorly and also with a short groove on the vertex, the supra-orbital ridges rather prominent; antennae moderately long, rather stout, joints 5–10 very gradually increasing in length, all longer than broad. Prothorax transverse, narrowed anteriorly. Elytra long, much wider than the prothorax, gradually narrowed from a little below the base.

Length 2½–3 mm.

Hab. S. Africa, Table Mountain (*W. Bevins*), Cape Town (*F. Purcell, in Mus. Cape Town*), Cape of Good Hope (*type of Thunberg*).

Described from three precisely similar males which are provisionally referred to *D. opacus* Thunb. The females may be mixed with those of the variable *D. thunbergi*. This is one of three extremely closely allied S. African *Dasytes* that seem to require distinctive names. The present insect is distinguishable from *D. thunbergi*, ♂, by the longer and less thickened antennae, and the densely punctulate, dull upper surfaces; and from *D. turneri* by the opaque head and prothorax, and the finer and denser sculpure.

14. Dasytes luteopubens.

? *Dasytes luteopubens* Pic, L'Echange, xxvii, p. 151 (1911).

♀. Elongate, narrow, black, opaque, thickly clothed with fine, adpressed, brownish-cinereous pubescence, without longer hairs intermixed; the entire upper surface alutaceous and densely, extremely finely punctured. Head much narrower than the prothorax, subtriangular; antennae rather slender, very short, thickened towards the apex, subserrate, joints 6–10 transverse. Prothorax broader than long, rounded at the sides, narrowed anteriorly and less strongly so towards the base. Elytra very long, much wider than the prothorax, a little widened posteriorly and

acuminate at the apex, without definite epipleura. Legs slender; tarsal claws small, equal, each with a membranous expansion beneath extending to near the tip.

Length 3½ mm.

Hab. S. Africa (*type of Pic*), Grahamstown (*ex coll. Fry*).

The above description is taken from two ♀♀ in the Fry collection. According to Pic, *D. luteopubens* should have a subquadrate prothorax and the pubescence on the disc arranged in a transverse V-shaped line; otherwise the brief diagnosis given by him accords with the insect before me. The small prothorax, long elytra, fine pubescence, and slender legs give it the facies of a *Dasytiscus*, *Listrus*, or *Danacaea*.

15. Dasytes stellatus, n. sp.

Rather convex, short, widened posteriorly, shining, clothed with long, fine, erect or semierect hairs; nigro-piceous, the labrum, basal joints of the antennae (1 excepted), basal margin of the prothorax in one specimen, and two transverse fasciae on the elytra (one before the middle and the other subapical, neither reaching the suture or outer margin), testaceous, the tarsi obscure testaceous; the head and prothorax very sparsely, finely, the elytra more closely, coarsely, punctate, the punctures on the latter angulate or stellate and in one specimen subseriately arranged anteriorly, the interspaces almost smooth. Head short, much narrower than the prothorax, the eyes rather prominent; antennae rather short, joint 3 narrow, 4–11 widened, 4 and 5 triangular, 6–10 strongly transverse, 11 ovate. Prothorax convex, broad, transverse, rounded at the sides, narrowed anteriorly, the basal margin raised. Elytra at the base slightly wider than the prothorax, widening to near the apex, the apex itself rounded. Legs slender; tarsi simple, the claws equal, without appendages beneath, a little widened at the base.

Length 2 mm. (♀ ?).

Hab. S. Africa, Malvern, Natal (*Mus. Durban and Mus. Cape Town*: 15, viii, 1902).

Three specimens. A very small, shining, hairy, rather convex, black insect, with bifasciate, rather coarsely stellato-punctate elytra, a short prothorax, slender legs, and non-appendiculate tarsal claws. The apical joint of the maxillary palpi is slender, fusiform. Till the sexes are identified, it must remain under *Dasytes*, a genus at present including many heterogeneous forms.

Calosotis.

Calosotis Redtenbacher, Reise Novara, ii, p. 106 (1867).

Dr. Holdhaus has been kind enough to present a co-type of the S. African *C. sctulosa* Redt., the type of the genus, to the British Museum. It is nearly related to *Dasytiscus* Kies., differing therefrom in having the antennae very short and obliquely serrate; the anterior and intermediate tibiae armed with a rather long, stout spur at the inner apical angle (somewhat incorrectly described as "calcare cochlaeaformi" by Redtenbacher); the tarsal joints 1–4 simple, short, and equal in width (1–3 are widened and 4 small in *Dasytiscus*); the claws small, equal, and furnished with a connate membranous appendage beneath; the upper surface of the body clothed with numerous, erect bristly hairs intermixed with the fine greyish pubescence. Length $2\frac{1}{3}$ mm.

No such insect has been found in the Cape Town Museum or in the extensive collections recently made in the same region by Mr. R. E. Turner; and it is probable that some mistake was made regarding the locality given, "Vorgebirge." The stout tibial spurs may be peculiar to the ♂?. *C. barkeri* Pic (1904), from Natal, has been referred by me to *Hapalochrus*.

Apterodasytes, n. gen.

Antennae inserted at some distance before the eyes, 11-jointed, slender; terminal joint of the maxillary and labial palpi narrow, subfusiform; mandibles stout, acute at tip, toothed at the apex beneath; labrum small; head simple, not wider than the prothorax, the epistoma confused with the front; prothorax subcylindrical; scutellum very small; elytra extremely short, not longer than the pronotum, leaving six abdominal segments exposed; tibiae narrow; tarsi clearly 5-jointed, simple, the claws short, small, equal, furnished with a membranous appendage beneath which nearly reaches the apex of the claw; wings wanting; body elongate, narrow, hairy, staphyliniform.

Type, *A. staphylinoides*.

The single species referred to *Apterodasytes* bears a remarkable resemblance to the Omaliid-genera *Arpedium* and *Micralymma*. The two sexes have not been identified; but as there is some variation in the length of the antennae in the specimens before me, it is possible that both ♂ and ♀ are represented. The elytra are not longer than the

prothorax, and are much shorter than in any described species of the Malachiid genera *Carphurus* and *Helcogaster*.

1. **Apterodasytes staphylinoides**, n. sp. (Fig. 4.)

Black, shining, the antennae in part or almost wholly, tibiae, and tarsi testaceous or obscure testaceous; sparsely clothed with long, erect, blackish hairs which on the elytra and abdomen are intermixed with an abundant, adpressed, rather long, cinereous pubescence; the head and prothorax very sparsely, the elytra and abdomen densely, rugulosely punctate, the punctures on the elytra rather coarse. Head moderately long, deeply longitudinally sulcate on each side anteriorly; antennae rather short, joints 9–11 perceptibly wider than those preceding, 9 and 10 about as long as broad, 11 ovate. Prothorax convex, as long as broad, narrowed towards the base and apex and deeply, transversely furrowed behind the anterior margin. Elytra at the base narrower than the prothorax, rapidly widening to the apex, obliquely truncate behind. Abdomen as long as or longer than the rest of the body, widening to beyond the middle, somewhat pointed at the tip. Legs moderately slender.

Length $2\frac{1}{5}$–$3\frac{1}{2}$ mm.

Hab. S. Africa, Prince Albert (*Dr. Purcell, Mus. Cape Town*).

Six specimens.

Alphabetical numbered List of Species enumerated in this Paper.

The generic names in brackets abbreviated thus: *P.*=*Pagurodactylus*, *Dasytoph.*=*Dasytophasis*, *D.*=*Dasytes*, *A.*=*Apterodasytes*; those marked with an asterisk are described as new.

albofasciatus (*Dasytoph.*), 2.
**angulatus* (*P.*), 17.
angustissimus (*P.*), 21.
**angustulus* (*P.*), 4.
capensis (*D.*), 9.
**capicola* (*Dasytoph.*), 1.
**cephalotes* (*P.*), 13.
circumcinctus (*P.*), 7.
coriaceipennis (*D.*), 8.
coriaceus (*D.*), 4.
coronatus (*P.*), 9.
costatipennis (*D.*), 5.
**cribricollis* (*D.*), 6.
**cribrosus* (*P.*), 3.
**debilis* (*P.*), 16.
disjunctus (*P.*), 20.
**fenestratus* (*P.*), 18.
**fibulatus* (*P.*), 1.
**flavocinctus* (*P.*), 11.
**flavosignatus* (*P.*), 12.
**funereus* (*P.*), 5.
lugens (*P.*), 6.
luteopubens (*D.*), 14.
marginipennis (*P.*), 14.
**masaicus* (*P.*), 23.
**metallicus* (*P.*), 19.

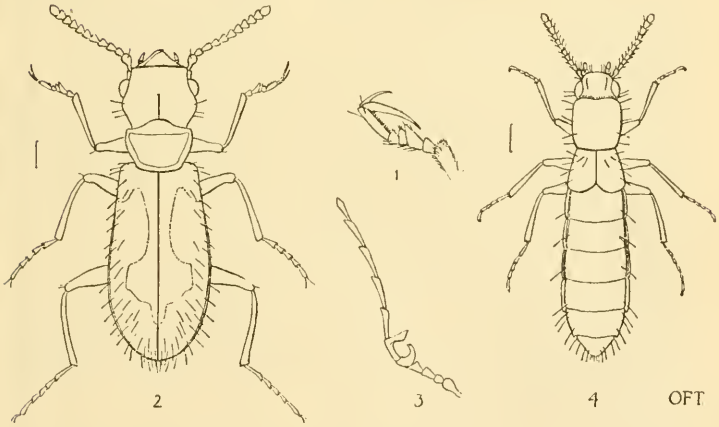
**nigrosetosus* (*P.*), 15.
nyassanus (*D.*), 3.
oneili (*D.*), 1.
opacus (*D.*), 13.
**parallelus* (*D.*), 10.
**rhodesianus* (*D.*), 2.
**rostralis* (*P.*), 22.
rubrocupreus (*D.*), 7.
**staphylinoides* (*A.*), 1.
**stellatus* (*D.*), 15.
**suturellus* (*P.*), 8.
**thunbergi* (*D.*), 12.
**translucidus* (*P.*), 10.
**turneri* (*D.*), 11.
vitticeps (*P.*), 2.

Synonym.

apicalis (*P.*), 20.

Species not identified or not separately enumerated.

caeruleus (*Dasytes*), p. 386.
donceeli (*Pagurodactylus*), p. 367.
nigerrimus (*Pseudopecteropus*), p. 367.
obscurus (*Xamerpus*), p. 367.
pallidonotatus (*Pseudopecteropus*), p. 367.
rufipes (*Dasytes*), p. 386.
setulosa (*Calosotis*), p. 395.
subconvexus v. *nigricolor* (*Microjulistus*), p. 367.
viridis (*Dasytes*), p. 386.



Explanation of Figures.

Fig. 1. *Pagurodactylus fibulatus*, ♂, anterior tarsus and claws.
2. „ *cephalotes*, ♂.
3. *Dasytophasis capicola* ♂, antenna.
4. *Apterodasytes staphylinoides*.

XV. *Coleoptera*: Melasidae *et* Elateridae *des Séchelles et des îles voisines.** Par E. Fleutiaux.

[Read June 7th, 1922.]

(Plate XXXIII.)

La faune entomologique des Séchelles était jusqu'à présent bien peu connue. Aucun Melasidae n'y avait été signalé encore. On trouvera plus loin, l'énumération de 7 espèces se répartissant en 6 genres différents (dont un nouveau); 3 sont déjà citées de la faune indo-malaise et les 4 autres sont nouvelles.

Quant aux Elateridae, la liste n'en était pas longue, leur nombre s'élevait seulement à 8 espèces, appartenant à 6 genres,† auxquelles on en peut ajouter une 9e, d'Aldabra.‡

* [This work forms part of the results of the Percy Sladen Trust Expedition to the Western Indian Ocean under the leadership of Prof. J. Stanley Gardiner, F.R.S., in 1905 and 1908–9. I am much indebted to the Entomological Society for accepting it for publication, since it has not proved possible to include all the reports on insects in the special series of volumes devoted to the Expedition (Trans. Linn. Soc. London, ser. 2, Zool., xii–xviii, from 1907 onwards), and a number of them have had to be published elsewhere. The majority of the specimens on which the present report is based were collected by myself in the Seychelles proper, and very largely in the endemic forests at high elevations. I am responsible for the portions of the locality-lists given in English and in inverted commas, these data being compiled from my notes and journal. The names of other collectors who formed part of, or assisted, the Expedition in the Seychelles or other islands in the same region are given in brackets in the locality-lists. A first set of the insects, including the types of all new forms, will be placed in the British Museum, and a second series will be kept in the Cambridge University Museum, while Monsieur Fleutiaux has retained certain examples for his collection. Exigencies of space have necessitated the arrangement of the bibliographical references in a somewhat shorter form than that used by the author in his manuscript, but nothing material has been omitted.—Hugh Scott.]

† Kolbe, Mitt. Zool. Mus. Berlin, v, 1910, p. 25: *Agrypnus aequalis* Candèze; *A. fuscipes* Fabricius; *Adelocera modesta* Boisduval; *Alaus mahenus* Fairmaire; *Psephus alluaudi* Fleutiaux; *Melanoxanthus melanocephalus* Fabricius; *M. cribricollis* Fleutiaux (= *puerulus* Cand. var.); *Cardiophorus submaculatus* Kolbe (= *lutosus* Cand.)

‡ Kolbe, Abhandl. Senckenb. Nat. Ges. xxvi, 1902, p. 575: *Heteroderes senex* Candèze (= *complanatus* Kolbe).

	Séchelles.	Amirantes.	Aldabra.	Farquhar.	Cargados.	Rodrigue.	Chagos.	Comores.	Mascareignes.	Madagascar.	Indo-Malaisie.	Régions tropicales universelles.
MELASIDAE.												
Xylobius mahenus, n. sp.	●											
Prolycaon (*n.g.*) *longicornis*, n. sp.	●											
Potergus filiformis Bonv.	●										●	
Arganus distinctus Bonv.	●										●	
Ceratus scotti, n. sp.	●											
Fornax sternalis Bonv.	●										●	
„ *puncticeps*, n. sp.	●						●					
ELATERIDAE.												
Agrypnus fuscipes Fabr.	●							●	●	●	●	
„ *aequalis* Cand.	●										●	
Adeloccra modesta Boisd.	●					●			●		●	●
Alaus mahenus Fairm.	●											
„ *scotti*, n. sp.	●											
Cardiophorus lutosus Cand.	●	●	●	●				●				
Cardiotarsus vitellinus Klug			●	●						●		
„ *brunneicollis* Er.					●				●	●		
„ *gardineri*, n. sp.			●	●								
Acoloides senex Cand.			●	●				●		●		
Trelasus (*n.g.*) *antennalis*, n. sp.	●											
Elastrus aldabrensis, n. sp.			●									
Megapenthes curtus Cand.	●										●	
„ *difformis*, n. sp.			●									
Melanoxanthus melanocephalus Fabr.	●							●	●	●	●	●
„ *insularis*, n. sp.	●											
„ *frivolus* Cand.	●										●	
„ *puerulus* Cand.	●	●					●				●	
Pseplus alluaudi Fleut.	●											
Gonodyrus (*n.g.*) *tarsalis*, n. sp.	●											
Dactylosimus (*n.g.*) *dorsalis*, n. sp.	●											
Porthmidius flavescens, n. sp.	●											
„ *solitarius*, n. sp.	●											
Conoderus gracilipes, n. sp.	●											
„ *dimidiaticollis*, n. sp.	●											

Aujourd'hui, l'on en compte 19 aux Séchelles seulement.

En comprenant dans le cadre de cette étude les Iles et groupes d'Iles de l'Océan Indien explorés par la " Percy Sladen Trust Expedition," nous arrivons au chiffre de 25 espèces (dont 12 nouvelles) réparties en 15 genres (dont 3 nouveaux). Voici la distribution géographique des deux familles :

TABLEAU DES FAMILLES.

Epistome continuant la courbure du front, échancré de chaque côté à la base. Labre invisible. Antennes séparées des yeux, insérées dans le fond de l'échancrure de l'épistome. Thorax fortement articulé . . . . . **Melasidae**, p. 400.

Epistome transversal, sur un plan inférieur, ne continuant pas la courbure du front, séparé de celui-ci par un rebord (épistome nul au milieu : *Adelocera*). Labre découvert. Antennes insérées en avant et contre les yeux. Thorax librement articulé . . . . . **Elateridae**, p. 406.

MELASIDAE.

TABLEAU DES SOUS-FAMILLES.

1. Propectus avec des sillons antennaires marginaux ou submarginaux 2
   Propectus sans sillons antennaires . . 1. **Melasinae**, p. 400.
2. Sillons pour les tarses sur le métasternum et l'abdomen, correspondant aux intermédiaires et aux postérieurs. Sillons antennaires submarginaux . . . . . II. **Gastraulacinae**, p. 402.
— Pas de sillons tarsaux. Sillons antennaires marginaux . . . . . III. **Eucneminae**, p. 403.

I. *MELASINAE*

TABLEAU DES GENRES.

Hanches postérieures subparallèles. Antennes n'atteignant pas la moitié du corps . Xylobius Latr., p. 401.

Hanches postérieures élargies en dedans. Antennes dépassant la moitié du corps Prolycaon, n. g., p. 401.

Xylobius Latr.

Xylobius Latreille, Ann. Soc. Ent. France, 1834, p. 124 (posthume); Lacordaire, Gen. Col. iv, 1857, pp. 102, 119; J. Duval, Gen. Col. Eur., iii, 1859–1863, pp. 119, 122; Bonvouloir, Ann. Soc. Ent. France, 1871 et 1875, Mon. Elat., pp. 75, 761; Fleutiaux, Ann. Soc. Ent. Belg., 1921, pp. 229, 295.

Genre fondé sur une vieille espèce européenne; *Elater corticalis* Paykull, 1800 (*alni* Fabricius, 1801). Il ne comprenait jusqu'à maintenant que 8 espèces, dont 3 propres à la faune orientale.

Les larves de deux d'entre elles ont été décrites et figurées. Ce sont : *X. humeralis* Dufour, in Bonvouloir, Mon. Euen., 1871, p. 53, t. 2, fig. 3, 3*a*, *b*; *X. corticalis* Reitter, Fauna Germ., Käf., iii, 1911, p. 206, fig. 66.

1. **Xylobius mahenus**, n. sp.

Long., 2 millim. ½. Oblong, convexe, subcylindrique; noir brillant, épistome ferrugineux, base des élytres jaune, pubescence jaune légère. Tête convexe, à ponctuation nette et peu serrée. Antennes noires, robustes : articles 2e et 3e petits, moins épais que les autres. Pronotum aussi long que large, arrondi en avant, vaguement roux sur les bords antérieur et postérieur; ponctuation fine, peu serrée, surtout en arrière. Elytres non striés, finement et éparsement ponctués. Dessous noir. Pattes jaunes.

Loc. "Seychelles : Mahé, high forest of Morne Pilot, 1500–2000 feet, xi. 1908"; 1 exemplaire.

A tout à fait l'apparence de *X. humeralis* Dufour, d'Europe; mais de taille beaucoup moindre et de ponctuation plus fine. La partie jaune de la base des élytres est moins étendue.

Prolycaon, n. g.

Corps oblong, peu convexe. Tête large et convexe. Epistome rétréci à la base. Antennes filiformes, longues et robustes : 2e article très petit; 3e plus long que le suivant; 4e et 5e égaux; les autres progressivement allongés. Pronotum moins long que large à la base, graduellement rétréci en avant, peu convexe, déprimé à la base. Elytres faiblement atténués, arrondis au sommet. Propleures triangulaires, sans impression antennaire. Prosternum convexe; sutures obliques; saillie large, courte. Epi-

sternes métathoraciques parallèles. Epipleures des élytres rétrécis en arrière. Hanches postérieures assez fortement élargies en dedans. Dernier arceau ventral arrondi. Pattes grêles : 4e article des tarses creusé en dessus pour recevoir le suivant, et dilaté en dessous.

A l'aspect de certains *Hemiopsida* (*Lycaon*), notamment de *H. nigricans* Bonvouloir, d'Australie. Mais la forme du 4e article des tarses le rapproche de *Pseudomenes* et de *Curticephalus* Fleutiaux.

2. **Prolycaon longicornis**, n. sp. (Pl. XXXIII, fig. 1.)

Long., 3 à 4 millim. ½. Brun rougeâtre plus ou moins clair sur les élytres; pubescence gris-jaunâtre peu abondante. Tête à ponctuation ombiliquée serrée. Epistome un peu moins large à la base que l'espace compris entre le fond de son échancrure et l'oeil. Antennes brunes, presque aussi longues que le corps. Pronotum à ponctuation dense, rugueuse, ombiliquée; angles postérieurs aigus, non divergents. Elytres rugueux, faiblement striés. Dessous de même couleur, ponctuation non rugueuse, plus grosse sur le propectus. Pattes jaunâtres; fémurs obscurcis.

Fig. 1.—*Prolycaon longicornis*, tarse postérieur vu du dessus.

Loc. " Seychelles : Praslin, from forest of Coco-de-mer palms (*Lodoicea*), Côtes d'Or Estate, xi. 1908 "; 3 exemplaires.

II. *GASTRAULACINAE.*

Potergus Bonv.

Potergus Bonvouloir, Ann. Soc. Ent. France, 1871, Mon. Eucn., pp. 64, 110; Fleutiaux, Ann. Soc. Ent. Belg., 1920, pp. 100, 101.

Ne comporte que la seule espèce suivante :

3. **Potergus filiformis** Bonv.

Potergus filiformis Bonvouloir, *op. cit.*, p. 111; Fleutiaux, Ann. Mus. Civ. Gen., 1896, p. 556; *id.*, Ann. Soc. Ent. Belg., 1899, p. 220.

Longtemps très rare et décrit sur un unique exemplaire rapporté de Nouvelle-Guinée par Wallace. Son habitat actuellement connu s'étend sur la ligne équatoriale jusqu'aux Séchelles, en remontant au nord à l'Himalaya.

Loc. "Seychelles : Mahé, from the forests of the Mare aux Cochons district, 1500–2000 feet, 26. i.–2. ii. 1909; 6 specimens found sitting on the upper sides of the leaves of endemic palms." Nouvelle-Guinée. Philippines. Bornéo. Malacca. Andaman. Assam. Côte occidentale indienne. Queensland. Forme typique primitive : Nouvelle-Guinée.

III. *EUCNEMINAE.*

TABLEAU DES GENRES.

1. Propleures n'atteignant pas le sommet du prosternum, très petits et excavés . Arganus Bonv., p. 403.
— Propleures atteignant le sommet du prosternum, grands, non excavés . . . . 2.
2. Deuxième et troisième articles des antennes petits, égaux . . . . . Ceratus Bonv., p. 403.
— Troisième article des antennes plus long que le deuxième . . . . . Fornax Cast., p. 404.

Arganus Bonv.

Arganus Bonvouloir, Ann. Soc. Ent. France, 1871, Mon. Eucn., pp. 67, 158; Fleutiaux, Ann. Soc. Ent. Belg., 1921, pp. 34, 94.

Ce genre ne compte qu'une seule espèce :

4. **Arganus distinctus** Bonv.

Arganus distinctus Bonvouloir, *op. cit.*, p. 159; Fleutiaux, Term. Füzetek, 1898, p. 232.

L'insecte des Séchelles présente les particularités suivants : antennes un peu moins épaisses; ponctuation du pronotum nettement ombiliquée.

Loc. " Seychelles : Mahé, Cascade Estate, about 1000 feet, ii.–iii. 1909 "; 1 exemplaire. Céram et Mysol. Nouvelle-Guinée. Philippines. Forme typique primitive : Céram.

Ceratus Bonv.

Ceratus Bonvouloir, Ann. Soc. Ent. France, 1871 et 1872, Mon. Eucn,. pp. 69 et 292; Fleutiaux, Ann. Soc. Ent. Belg., 1921, pp. 35, 95.

Genre exclusivement indo-malais qui comprend une douzaine d'espèces.

5. Ceratus scotti, n. sp.

Long., 4 millim. ¾ à 8 millim. Allongé, convexe; brun plus ou moins rougeâtre, pubescence jaune assez longue. Tête à ponctuation ombiliquée serrée. Antennes ferrugineuses, filiformes, atteignant la moitié du corps chez le mâle, plus courtes chez la femelle : 2e et 3e articles petits, subégaux ; les suivants beaucoup plus longs et plus épais. Pronotum aussi long que large, droit sur les côtés, largement arrondi en avant, convexe, fortement et rugueusement

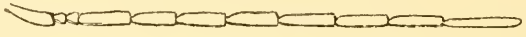


Fig. 2.—*Ceratus scotti*, ♂, antenne.

ponctué. Elytres subparallèles jusqu'au delà de la moitié, rétrécis ensuite et terminés en pointe obtuse, convexes, rugueux à la base, finement pointillés en arrière, légèrement striés. Dessous rougeâtre. Propectus densement ponctué. Sillons antennaires larges et peu profonds, ponctués, nettement limités en dedans par une carène. Saillie prosternale courte, graduellement terminée en pointe. Métasternum finement ponctué. Hanches postérieures obliques, très élargies en dedans, anguleuses. Abdomen superficiellement ponctué ; dernier arceau ventral arrondi. Pattes ferrugineuses.

Le mâle est de taille plus petite que la femelle, son corps moins robuste, ses antennes plus longues, son pronotum plus allongé, le dernier arceau ventral moins largement arrondi.

A rapprocher de *C. insolitus* Bonvouloir, de Java.

Loc. " Seychelles : Mahé; high forest of Morne Pilot; Cascade Estate, forest above 1000 feet "; 7 exemplaires.

Fornax Cast.

Fornax Castelnau, in Silbermann, Rev. Ent., iii, 1835, pp. 167, 172; Lacordaire, Gen. Col., iv, 1857, pp. 102, 110, pars; Bonvouloir, Ann. Soc. Ent. France, 1871 et 1872, Mon. Euen., pp. 69, 295; Fleutiaux, Ann. Soc. Ent. Belg., 1921, pp. 38, 124.

Décrit sur une espèce de la Guyane française : *ruficollis*, le genre *Fornax* s'est rapidement accru, au point de compter aujourd'hui environ 200 espèces réparties dans les

régions intertropicales et plus particulièrement dans les contrées de l'Indo-Malaisie. Quelques-unes seulement habitent l'Afrique et à peu près une douzaine se rencontrent à Madagascar et dans les archipels voisins.

Plusieurs larves sont connues, entre autres celle du *F. madagascariensis* Castelnau, longuement décrite et figurée par Coquerel, dans les Ann. Soc. Ent. France, 1856, p. 511, t. 15, fig. 3*j*. Elle vit dans le bois pourri.

ESPÈCES.

Pointe prosternale parallèle, carrément rétrécie au sommet et terminée au milieu par une courte dent . . . . . *sternalis*, Bonv., p. 405.
Pointe prosternale graduellement rétrécie *puncticeps*, n. sp., p.406.

6. Fornax sternalis Bonv.

Fornax sternalis Bonvouloir, *op. cit.* 1872, pp. 305, 368, t. 17, fig. 7.*

Espèce décrite de Batchian sur un exemplaire unique rapporté par Wallace; le type est passé avec toute la collection de Bonvouloir, en la possession de M. René Oberthur.† Les individus des Séchelles ont un épistome plus étroit à la base, les propleures alutacés et parsemés de gros points peu profonds, le prosternum finement et peu densement ponctué.

Loc. "Seychelles : Silhouette; forest near Mont Pot-à-eau, about 1500 feet, viii. 1908; Mare aux Cochons, over 1000 feet, ix. 1908"; 4 exemplaires. Forme typique primitive : Batchian.

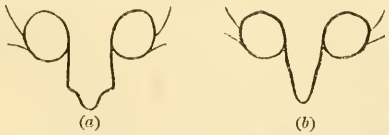


Fig. 3.—Pointe prosternale (*a*) du *Fornax sternalis* Bonv.; (*b*) du *Fornax puncticeps*, n. sp.

* *F. sternalis* ‡ Fleutiaux, Mém. Soc. Zool. France, 1896, p. 286 (non Bonvouloir, 1872), de Nouvelle-Guinée, est une espèce différente, probablement déjà décrite sous un autre nom.

† Voir Ann. Soc. Ent. France, 1888, p. 159.

7. **Fornax puncticeps**, n. sp.

Long., 5 millim. $\frac{1}{2}$. Allongé, peu convexe ; brun, un peu rougeâtre vers l'extrémité des élytres, peu brillant, pubescence jaune. Tête convexe, à ponctuation assez serrée. Epistome plus étroit à la base que l'espace compris entre le fond de son échancrure et l'œil. Antennes brunes, filiformes : 4e article plus long que le 2e ; 3e environ aussi long que les 4e et 5e réunis ; ces derniers égaux. Pronotum aussi long que large à la base, peu convexe, peu rétréci en avant ; ponctuation peu serrée. Elytres graduellement rétrécis et terminés en pointe obtuse, finement et éparsement ponctués, très légèrement striés dans la région suturale, indistinctement sur les côtés. Dessous de même couleur. Ponctuation des propleures un peu plus forte que celle du prosternum. Saillie prosternale graduellement rétrécie et terminée en pointe obtuse. Métasternum et abdomen finement ponctués. Hanches postérieures très élargies en dedans, anguleuses. Dernier arceau ventral en pointe arrondie au sommet. Pattes ferrugineux-obscur.

En suivant le tableau de Bonvouloir, on arrive à rapprocher cette espèce de *F. dohrni*, dont la provenance est inconnue.

Loc. "Seychelles and Chagos Islands. Seychelles : Mahé, near Morne Blanc, about 1000 feet, xi. 1908, 1 specimen. Chagos : Egmont Atoll, 1905 (*Gardiner*), 1 specimen."

ELATERIDAE.

TABLEAU DES SOUS-FAMILLES.

1. Sutures prosternales ouvertes pour recevoir les antennes . . . . . I. **Agrypninae**, p. 407.
— Sutures prosternales fermées ou simplement sillonnées . . . . . 2.
2. Corps recouvert d'une pubescence squameuse épaisse masquant complétement le fond II. **Hemirhipinae**, p. 411.
— Pubescence légère, ne cachant pas les téguments . . . . . 3.
3. Prothorax globuleux . . . . III. **Esthesopinae**, p. 413.
— Prothorax plus ou moins convexe, mais rétréci en avant . . . . . 4.

4. Tarses simples . . . . . IV. **Elaterinae,** p. 418.
— Tarses avec un ou deux articles creusés en dessus et dilatés en dessous . . . . . 5.
5. Tarses avec les 2e et 3e articles lamellés V. **Dicrepidiinae,** p. 428.
— Tarses avec le 3e article dilaté et le 4e lamellé VI. **Pachyderinae** p. 429.
— Tarses avec le 3e article seul lamellé VII. **Physorhininae,** p. 431.
— Tarses avec le 4e article seul dilaté-lamellé VIII. **Conoderinae,** p. 434.

I. *AGRYPNINAE.*

TABLEAU DES GENRES.

Taille grande (27 à 35 millim.). Propleures nullement sillonnés en travers pour les tarses antérieurs . . . . . Agrypnus Eschsch., p. 407.
Taille beaucoup moindre (10 à 12 millim.). Propleures fortement sillonnés en travers pour les tarses antérieurs . . . Adelocera Germar, p. 409.

Agrypnus Eschsch.

Agrypnus Eschscholtz, in Thon, Ent. Archiv., ii, 1, 1829, p. 32, pars; Latreille, Ann. Soc. Ent. France, 1834, p. 143; Lacordaire, Gen. Col., iv, 1857, pp. 138, 139; Candèze, Mon. Elat., i, 1857, pp. 19, 20; Schwarz, in Wytsman, Gen. Ins., Elat., 1906, pp. 5, 7.
Amaurus Castelnau, Hist. Nat. Col., i, 1840, p. 237.

Genre renfermant environ 70 espèces homogènes, habitant presque toutes les régions tropicales, sauf toutefois l'Amérique du Sud. Ses représentants sont très abondants dans les contrées indo-malaises et en Afrique. Deux seulement, propres au continent indien et à l'Archipel asiatique, se retrouvent à Madagascar et dans les îles voisines.

ESPÈCES.

Noir brillant; pubescence peu apparente, presque nulle . . . . . *fuscipes* Fabr., p. 408.
Noir presque mat; pubescence jaune assez fournie, très apparente . . . . . *aequalis* Cand., p. 409.

8. **Agrypnus fuscipes** (Fabr.).

Elater fuscipes Fabricius, Syst. Ent. 1775, p. 211; *id.*, Spec. Ins., i, 1781, p. 226; Fuessly, Arch. Ins., v, 1784, p. 110, t. 27, fig. 4; Fabricius, Mant. Ins., i, 1787, p. 172; *id.*, Ent. Syst. i, 2, 1792, p. 218; *id.*, Syst. Eleuth. ii, 1801, p. 224.

Agrypnus fuscipes Germar, Zeitschr. Ent., ii, 1840, p. 253; Candèze, Mon. Elat., i, 1857, pp. 23, 24; *id.*, Révis. Mon. Elat. 1874, pp. 3, 7; *id.*, C.R. Soc. Ent. Belg., 1890, p. 148; *id.*, Cat. Méth. Elat., 1891, p. 10; Fairmaire, Bull. Soc. Ent. France, 1893, p. 323; Fleutiaux, Bull. Soc. Ent. France, 1893, p. 329; Candèze, Ann. Soc. Ent. Belg., 1895, p. 52; Alluaud, in Grandidier, Hist. Madag. xxi, 1900, p. 204; Fleutiaux, Bull. Soc. Ent. France, 1903, p. 13; Schwarz, in Wytsman, Gen. Ins., Elat., 1906, p. 8, no. 26; Kolbe, Mitt. Zool. Mus. Berlin, v, 1910, p. 25; Fleutiaux, Ann. Soc. Ent. France, 1911, p. 474; *id.*, *op. cit.* 1918, p. 182.

Amaurus fuscipes Castelnau, Hist. Nat. Col., i, 1840, p. 237.

Moeurs : Lequien, Mag. Zool., 1831, t. 41 *; Audouin et Brullé, Hist. Nat. Col., i, 1834, p. 268, t. 9, fig. 2*b* *; Westwood, Introd., i, 1839, p. 67, fig. 2 *; Chapuis et Candèze, Cat. Larv. Col., 1853, p. 482; Xambeu, Ann. Soc. Linn. Lyon, 1912, p. 120.

Très ancienne et commune espèce répandue dans les collections. Elle a été prise comme co-type du genre par Latreille, Ann. Soc. Ent. France, 1834, p. 143 (posthume).

On sait que *Elater fuscipes* ‡ Olivier, 1790, se rapporte à *Elater notodonta* Latreille, 1823, d'Afrique; il est probable qu'il en est de même de *Elater fuscipes* Herbst, 1801.

Loc. " Seychelles : Mahé; Port Victoria, 1908–9 (*R. P. Dupont*); 1905 (*Gardiner*); 6 examples : " Mahé, " auf Kulturboden " (*Brauer*) : Mahé et La Digue, 1892 (*Alluaud*). Indes orientales. Bengale. Cochinchine ?. Ceylan. Madagascar, nord de l'île. Comores. Mascareignes. Forme typique primitive : Indes orientales.

* Larve attribuée à un Carabide : *Anthia sexguttata* Fabr.

9. Agrypnus aequalis Cand.

Agrypnus aequalis Candèze, Mon. Elat., i, 1857, pp. 23, 25; *id.*, Révis. Mon. Elat., 1874, pp. 3, 9; *id.*, Ann. Mus. Genova, 1878, p. 99; Fleutiaux, Ann. Soc. Ent. France, 1889, p. 138; Candèze, Cat. Méth. Elat., 1891, p. 10; Fleutiaux, Ann. Soc. Ent. France, 1902, p. 571; *id.*, Bull. Soc. Ent. France, 1903, p. 13; Schwarz, in Wytsman, Gen. Ins., Elat., 1906, p. 8, no. 30; Kolbe, Mitt. Zool. Mus. Berlin, v, 1910, p. 25; Fleutiaux, Ann. Soc. Ent. France, 1918, p. 182; *id.*, Bull. Mus. Paris, 1918, p. 205.

Agrypnus punctatus Candèze, Mon. Elat., i, 1857, pp. 22, 26; *id.*, Révis. Mon. Elat., 1874, pp. 3, 10; *id.*, C.R. Soc. Ent. Belg., 1890, p. 148; *id.*, Cat. Méth. Elat., 1891, p. 11; *id.*, Ann. Soc. Ent. Belg., 1892, p. 483; *id.*, Ann. Mus. Genova, 1892, p. 801; Alluaud, in Grandidier, Hist. Madag., xxi, 1900, p. 204; Schwarz, in Wytsman, Gen. Ins., Elat., 1906, p. 8, no. 31.

Agrypnus sondaicus Candèze, Mon. Elat., i, 1857, pp. 23, 33; *id.*, Cat. Méth. Elat., 1891, p. 10.

Agrypnus insularis Fairmaire, Bull. Soc. Ent. France, 1891, p. 70; Fleutiaux, Bull Soc. Ent. France, 1894, p. 252; Candèze, Ann. Soc. Ent. Belg., 1895, p. 69; Linell, Proc. U.S. Nat. Mus., xix, 1897, p. 696.

A reçu plusieurs noms. La forme originelle, *aequalis*, est décrite des Indes orientales; *punctatus* et *sondaicus*, de Java; et *insularis* des Séchelles. Les exemplaires de cette dernière provenance se distinguent par le tubercule du milieu de la base du pronotum moins saillant. Le type de *insularis* Fairmaire, Séchelles (R. P. Philibert), est au Musée de Bruxelles, dans la dernière collection Candèze.

Loc. "Seychelles: Mahé, 1905 and 1908–9 (Port Victoria, etc.): Long Island, vii. 1908; 8 examples": Mahé, Mamelles (*Brauer*): Mahé et La Digue, 1892 (*Alluaud*). Indes orientales. Ceylan. Birmanie. Bengale. Indochine. Archipel asiatique. Forme typique primitive: Indes orientales.

Adelocera Germ.

Adelocera Germar, Zeitschr. Ent., ii, 1840, pp. 251, 255; Lacordaire, Gen. Col., iv, 1857, pp. 138, 140;

Candèze, Mon. Elat., i, 1857, pp. 19, 47; J. Duval, Gen. Col. Eur., iii, 1860, pp. 125, 142; Schwarz, in Wytsman, Gen. Ins., Elat., 1906, pp. 6, 10.

On connait une centaine d'espèces disséminées sur toute la surface du globe; le quart à peu près appartiennent à la faune indo-malaise et une dizaine à la faune malgache. La seule espèce rencontrée aux Séchelles et aux Mascareignes est cosmopolite tropicale.

10. **Adelocera modesta** (Boisd.).

Agrypnus modestus Boisduval, Voy. Astrol., Ent., 1835, Col., p. 108.

Adelocera modesta Candèze, Mon. Elat., i, 1857, pp. 51, 71; *id.*, Révis. Mon. Elat., 1874, pp. 6, 27; *id.*, C.R. Soc. Ent. Belg., 1875, p. 118; G. Horn, Trans. Amer. Ent. Soc., vii, 1878–9, pp. 14, 15; C. O. Waterhouse, Phil. Trans. Roy. Soc., clxviii, 1879, p. 525; Blackburn and Sharp, Trans. R. Dublin Soc. (2), iii, 1885, p. 240; Fleutiaux, Ann. Soc. Ent. France, 1889, p. 139; *id., op. cit.* 1891, p. 387; Candèze, Cat. Méth. Elat., 1891, p. 14; *id.*, Ann. Mus. Genova, 1892, p. 796; Champion, Biol. Centr.-Am., Col., iii, 1, 1894, p. 258, note; Alluaud, in Grandidier, Hist. Madag., xxi, 1900, p. 205; Fauvel, Rev. d'Ent., 1904, p. 124; Fleutiaux, Ann. Soc. Ent. France, 1905, p. 319; Schwarz, in Wytsman, Gen. Ins., Elat., 1906, p. 13, no. 86; Kolbe, Mitt. Zool. Mus. Berlin, v, 1910, p. 26; Stebbing, Indian Forest Insects, 1914, p. 224, fig. 145; Fleutiaux, Ann. Soc. Ent. France, 1918, p. 186; *id.*, Bull. Mus. Paris, 1918, p. 207; *id.*, Bull. Soc. Ent. France, 1920, pp. 112, 113.

Adelocera modesta var. *guadulpensis* Fleutiaux et Sallé, Ann. Soc. Ent. France, 1889, p. 407; Fleutiaux, *op. cit.* 1911, p. 246.

Agrypnus pruinosus Fairmaire, Rev. et. Mag. Zool., 1849, p. 35; *Adelocera pruinosa*, *id.*, *t. c.* p. 359.

Agrypnus squalidus Fairmaire, *t. c.* p. 35; *Adelocera squalida*, *id.*, *t. c.* p. 359.

Agrypnus nigroplagiatus E. Blanchard, Voy. Pôle Sud, iv, 1853, p. 85, t. 6, fig. 7.

Adelocera vicina Candèze, Ann. Mus. Genova, 1891, p. 772.

Adelocera tessellata Candèze, Elat. Nouv., v, 1893, p. 6.

Moeurs : E. P. Stebbing, Indian Forest Insects (London, 1914), p. 224.

Espèce bien souvent décrite, sous des noms différents, de tous les pays de la zone tropicale. D'après Fairmaire, elle aurait été prise à Taïti, par Vesco, sous les écorces et dans le bois carié d'*Erythrina indica*, et aussi dans un fruit pourri d'*Inocarpus edulis*. Blackburn et Sharp la signalent dans les vieux troncs de cactus aux Iles Hawaï. Enfin Stebbing l'a observée dans les forêts de teck (*Tectona grandis*) de Haute-Birmanie.

Loc. " Seychelles and Rodriguez. Seychelles; Long Island, etc. Rodriguez (*Thomasset and Snell*, 1918); 6 examples." Mahé, " auf Kulturboden " (*Brauer*). Régions tropicales universelles. Mascareignes. Forme typique primitive : Nouvelle-Hollande.

II. *HEMIRHIPINAE.*

Alaus Eschsch.

Alaus Eschscholtz, in Thon, Ent. Archiv, ii, 1, 1829, p. 33; Lacordaire, Gen. Col., iv, 1857, pp. 148, 151; Candèze, Mon. Elat., i, 1857, pp. 201, 211; J. Duval, Gen. Col. Eur., iii, 1860, pp. 126, 142; Schwarz, in Wytsman, Gen. Ins., Elat., 1906, pp. 32, 35.

Les insectes qui entrent dans ce genre sont de grande taille et généralement parés d'une vestiture épaisse plus ou moins mouchetée et variée en couleurs. *Elater oculatus* Linné, 1758, et *Elater myops* Fabricius, 1801, de l'Amérique du Nord ont servi à son établissement.

Sur 180 espèces environ qui sont connues, plus d'une centaine sont répandues dans la zone indienne, l'Archipel asiatique et l'Océanie; une cinquantaine habitent l'Afrique; une quinzaine l'Amérique; une seule fait partir de la faune paléaretique. Il n'en a pas encore été signalé à Madagascar, mais une espèce est originaire des Comores, et les deux suivantes se rencontrent aux Séchelles. Les premiers états de 6 seulement d'entre elles ont été mentionnés à ce jour.

ESPÈCES.

Troisième article des antennes à peine plus long que le deuxième. Interstries des élytres alternativement costiformes . . . . . *mahenus* Fairm., p. 412.

Troisième article des antennes une fois et demie plus long que le deuxième. Interstries des élytres non costiformes . . . . . *scotti*, n. sp., p. 412.

11. Alaus mahenus Fairm.

Alaus mahenus Fairmaire, Bull. Soc. Ent. France, 1892, p. 151; Candèze, Ann. Soc. Ent. Belg., 1895, p. 69; Alluaud, in Grandidier, Hist. Madag., xxi, 1900, p. 212; Fleutiaux, Bull. Soc. Ent. France, 1903, p. 13; Schwarz, in Wytsman, Gen. Ins., Elat., 1906, p. 36, no. 18; Kolbe, Mitt. Zool. Mus. Berl., v, 1910, p. 25.

♂ : Antennes n'atteignant pas tout à fait la base du pronotum; 2e article très petit, globuleux; 3e à peine plus long, denté; les suivants beaucoup plus longs, fortement comprimés et dentés. Pronotum à bords latéraux redressés, sinueux. Sommet des élytres tronqué en cercle et bidenté. Dernier arceau ventral arrondi, frangé de poils raides très courts, blanchâtres, semblable à ceux de la pubescence.

♀ : Antennes plus courtes, moins fortement comprimées et dentées. Pronotum plus arrondi sur les côtés. Sommet des élytres moins nettement tronqué. Dernier arceau ventral largement et carrément tronqué, bordé en poils bruns plus longs que ceux de la pubescence.

Loc. "Seychelles : Mahé; 1 ♀, 1905 (*Gardiner*); 1 ♂, Port Victoria (*Dupont*)." Mahé, Mamelles, vi–vii, "in alten Baumstämmen" (*Brauer*). Mahé et La Digue, 1892 (*Alluaud*). Forme typique primitive : Séchelles.

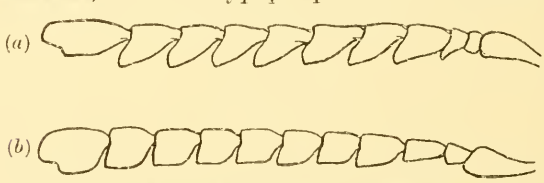


Fig. 4.—Antenne (*a*) du *Alaus mahenus* Fairm., ♀; (*b*) du *Alaus scotti*, n. sp., ♀.

12. Alaus scotti, n. sp.

Long., 16 millim. ♀. Oblong, convexe; noir, rougeâtre par places; entièrement couvert d'un pelage serré d'un gris blanchâtre masquant le fond; orné de deux taches rondes noires sur le disque du pronotum, et de quelques autres formant des hachures irrégulières vers le tiers postérieur des élytres et avant l'extrémité. Tête déprimée au milieu. Antennes noires, avec le premier article ferrugineux; dépassant la moitié du pronotum : 2e article petit; 3e une fois et demie plus long; suivants comprimés et dentés.

Pronotum plus long que large, arrondi et sinué sur les côtés, très bombé, irrégulièrement ponctué; bords latéraux étroitement déprimés; angles postérieurs aigus et divergents, non distinctement carènés. Ecusson ovale, en plan incliné. Elytres de la largeur du pronotum, subparallèles jusqu'au tiers postérieur, puis rétrécis, tronqués en cercle au sommet et bidentés; ponctués-striés; interstries presque plans, très finement pointillés. Dernier arceau ventral largement tronqué, bordé de poils noirs. Pattes d'un jaune flave, à courte pubescence blanchâtre; tarses obscurs.

Très voisin de *A. mahenus* Fairmaire. Pubescence moins épaisse, moins blanche, plutôt grise. Premier article des antennes ferrugineux; 3e proportionnellement plus long par rapport au 2e. Côtés du pronotum plus arrondis; angles postérieurs non distinctement carénés. Ecusson ovale. Interstries des élytres nullement convexes et ne formant pas de côtes. Pattes jaunes, avec les tarses noirâtres.

Loc. "Seychelles: Silhouette, Mare aux Cochons, over 1000 feet, ix. 1908; 1 specimen."

III. *ESTHESOPINAE.*

Le nom de Cardiophorinae, généralement employé, doit céder la place à celui de Esthesopinae; le genre *Esthesopus* étant le premier décrit.

TABLEAU DES GENRES.

Quatrième article des tarses normal Cardiophorus Eschsch., p. 413.
Quatrième article des tarses dilaté . Cardiotarsus Cast., p. 415.

Cardiophorus Eschsch.

Cardiophorus Eschscholtz, in Thon, Ent. Archiv, ii, 1, 1829, p. 34; Lacordaire, Gen. Col. iv, 1857, pp. 168, 193; Candèze, Mon. Elat., iii, 1860, pp. 104, 106; J. Duval, Gen. Col. Eur., iii, 1860, pp. 141, 144; Schwarz, in Wytsman, Gen. Ins., Elat., 1906, pp. 160, 162.

Le genre *Cardiophorus* est mondial; il est basé sur des espèces de l'Ancien-Monde antérieurement décrites. C'est l'un des plus nombreux puisqu'il renferme plus de 500 représentants très homogènes; et c'est à peine si l'on connait quelques larves européennes. Sur ce nombre considé-

rable, une vingtaine d'espèces se trouvent à Madagascar et dans les archipels voisins.

13. Cardiophorus lutosus Cand.

Cardiophorus lutosus Candèze, Elat. Nouv., vi, 1896, p. 57; *id.*, Ann. Soc. Ent. Belg., 1895, p. 69; Alluaud, in Grandidier, Hist. Madag., xxi, 1900, p. 219; Schwarz, in Wytsman, Gen. Ins., Elat., 1906, p. 170, no. 105; Fleutiaux, Ann. Soc. Ent. France, 1911, p. 478.

Cardiophorus hedenborgi ‡ Fairmaire, Ann. Soc. Ent. Belg., 1893, p. 523 (non Candèze, 1860).

Cardiophorus submaculatus ‡ Kolbe, Mitt. Zool. Mus. Berlin, v, 1910, p. 26 (non Candèze, 1878).

J'ai toutes les raisons de penser que *C. hedenborgi* Fairmaire (1893), de Grande-Comore, se rapporte à *C. lutosus* Candèze (1896). Et cela parce que dans la liste donnée par celui-ci en 1895 des Elatérides des Comores, Séchelles et Mascareignes, il n'est pas question de cette espèce, qu'il n'eut pas manqué de citer, puisque la collection Fairmaire était entre ses mains depuis 1894.

Quant au *C. submaculatus* Kolbe, j'en possède un individu que j'ai reçu sous le nom erroné de *C. raffrayi* Schwarz, espèce de l'Est-Africain. Il provient des chasses de Brauer aux Séchelles, parconséquent il n'y a aucun doute à son sujet.

C. lutosus est très proche parent de *C. decretus* Candèze, de Madagascar. Cette espèce a été récoltée en grand nombre. Le plus souvent elle est noire avec quatre taches jaunes sur les élytres qui s'étalent au point de se réunir le long des bords latéraux. En dehors de ces variations dont il est difficile, pour ne pas dire impossible, de saisir les limites, trois formes se distinguent suffisamment, ce sont :

(*a*) variété *thoracicus*. Brun noirâtre; élytres jaunes avec seulement un tache obscure sur la suture avant l'extrémité. *Loc.* Amirantes (Eagle I., 1905).

(*b*) variété *trimaculatus*. Pronotum entièrement roux; élytres avec une petite tache obscure à la moitié, de chaque côté de la suture et une autre près du bout, sur la suture elle-même. *Loc.* Coetivy (1905).

(*c*) variété *immaculatus*. Corps entièrement jaune. *Loc.* Coetivy (1905).

Le pronotum n'est pas " aequaliter punctulato," comme il est dit dans la description; la ponctuation, très fine et très dense, est parsemée de points un peu plus gros.

Environ 90 exemplaires.

Loc. Seychelles, Amirantes, Coetivy, Farquhar, Aldabra, Comores.

" Seychelles : Silhouette (over 1000 feet, viii.–ix. 1908, 3 examples); Praslin (1905, 1 example); Dennis I. (1 example, viii. 1908, *Fryer*); Long I. (12 examples, vii. 1908); Mahé (25 examples, 1905, 1908–9); Anonyme I. (1 example, i. 1909). Nearly all the specimens were taken near the coast, the species being found abundantly among the foliage of certain wild dicotyledonous trees which fringe the coasts of islands in this region (*Scott*)." Mahé et Praslin (*Brauer*). Amirantes : Eagle I., 1905. Coetivy : 18 exemplaires, 1905. Aldabra : Takamaka, x.–xi. 1908 (*Fryer*), 23 exemplaires. Farquhar : (*Daruty*, Muséum Paris). Comores : Mayotte (forme typique primitive).

Cardiotarsus Cast.

Cardiotarsus Castelnau, in Silbermann, Rev. Ent., iv, 1836, p. 4; Lacordaire, Gen. Col., iv, 1857, pp. 168, 192; Candèze, Mon. Elat., iii, 1860, pp. 104, 223; Schwarz, in Wytsman, Gen. Ins., Elat., 1906, pp. 160, 174.

Les *Cardiotarsus* ne diffèrent guère des *Cardiophorus* que par le 4e article des tarses dilaté. Une trentaine d'es-

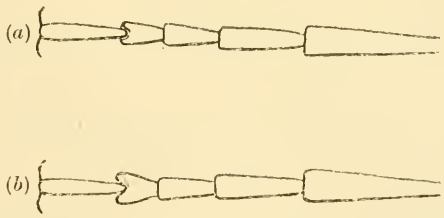


Fig. 5.—Tarse postérieur, vu du dessus, (*a*) du *Cardiophorus lutosus* Cand.; (*b*) du *Cardiotarsus gardineri*, n. sp.

pèces sont décrites, dont le tiers à peu près appartiennent à la faune de Madagascar et îles avoisinantes, les deux autres tiers sont partagés en parties à peu près égales entre l'Afrique et l'Indo-Malaisie. Ni Castelnau, ni Lacordaire

n'ont désigné l'espèce génotype; c'est seulement Candèze qui, en premier rang place *Cardiophorus acuminatus* Guérin, 1847.

ESPÈCES.

(*a*) Ongles simples. Elytres jaunes ou avec une tache suturale obscure . . . . . *vitellinus* Klug, p. 416.

(*b*) Ongles simples. Elytres d'une brun uniforme *gardineri*, n. sp. p. 417.

(*c*) Ongles dentés. Elytres brunâtres avec une tache humérale plus claire . *brunneicollis* Erichs., p. 417.

14. Cardiotarsus vitellinus (Klug).

Cardiophorus vitellinus Klug, Abh. Akad. Berlin, 1833, p. 67; Erichson, in Germar, Zeitschr. Ent., ii, 1840, p. 334; Brancksik, Jahr. Ver. Trenes., xvi, 1893, p. 235.

Cardiotarsus vitellinus Candèze, Mon. Elat., iii, 1860, p. 228; *id.*, Cat. Méth. Elat., 1891, p. 134: *id.*, Ann. Soc. Ent. Belg., 1895, p. 66; Alluaud, in Grandidier, Hist. Madag., xxi, 1900, p. 220; Schwarz, in Wytsman, Gen. Ins., Elat., 1906, p. 174, no. 8.

Cardiophorus dispilus Klug, *op. cit.*, p. 68; Erichson, *op. cit.*, p. 335; Alluaud, *op. cit.*, p. 218.

Cardiophorus tabidus Erichson, *op. cit.*, p. 334.

Cardiotarsus tabidus Candèze, Mon. Elat., iii, 1860, pp. 224, 227.

Coloration assez variable. Tantôt la tête et le pronotum sont brun noirâtre et la suture des élytres obscurcie. Tantôt le corps tout entier est jaune; c'est avec cette dernière forme que Candèze a établi sa variété *a*. Tantôt enfin le pronotum est marqué de deux bandes noirâtres dans le sens de la longueur; c'est très certainement *C. dispilus* Klug, omis par Candèze et par Schwarz.

9 exemplaires.

Loc. Aldabra; Farquhar Group. Aldabra: x.–xii. 1908 (*Fryer*); 1907 (*Thomasset*). Farquhar: Providence, Cerf I., 3. x. 1905 (1 exemplaire, *Gardiner*); (*Daruty*, Muséum Paris). Madagascar, toute la partie septentrionale de l'Ile, au nord de Tananarive. Forme typique primitive: Madagascar.

15. Cardiotarsus gardineri, n. sp.

Long., 8 à 9 millim. Allongé, convexe; brun plus ou moins foncé ou noirâtre, généralement plus clair sur les élytres, peu brillant; pubescence jaune. Tête petite, arrondie et rebordée en avant, subdéprimée, très finement et densement ponctuée. Antennes jaunes, fines, amincies vers l'extrémité, ne dépassant pas la base du pronotum; articles légèrement et graduellement épaissis vers le bout. Pronotum globuleux, aussi long que large, arrondi en avant, rétréci en arrière; ponctuation double, irrégulièrement serrée; angles postérieurs courts. Elytres à peu près de la largeur du pronotum, en ovale allongé, atténués vers le bout, convexes, fortement ponctués-striés; interstries convexes et très finement rugueux. Dessous de même couleur. Propectus à ponctuation extrêmement fine et serrée; limites latérales inférieures et abrégées en avant. Prosternum étroit et parallèle. Métasternum et abdomen à ponctuation double. Episternes métathoraciques parallèles, aussi larges que les épipleures des élytres à la moitié de leur longueur. Hanches postérieures normalement élargies en dedans. Derniers arceaux ventraux plus fortement ponctués que les autres de larges points superficiels ponctués eux-mêmes à l'intérieur. Pattes jaunes, fémurs plus pâles; tarses postérieurs plus courts que le tibia correspondant, leur 4e article nettement cordiforme et dilaté, griffes simples.

Ressemble beaucoup à *C. plebejus* Candèze, de Madagascar. Ponctuation du pronotum moins fine et moins régulière, formée de points de deux grosseurs; élytres moins noirs.

Loc. Aldabra: 5 exemplaires, xii. 1908 (*Fryer*). Farquhar Atoll: 9 exemplaires, 1905 (*Gardiner*).

16. Cardiotarsus brunneicollis (Erichs.).

Cardiophorus brunneicollis Erichson, in Germar, Zeitschr. Ent. ii, 1840, p. 334.

Cardiotarsus brunneicollis Candèze, Mon. Elat., iii, 1860, pp. 224, 229; *id.*, Cat. Méth. Elat., 1891, p. 134; *id.*, Ann. Soc. Ent. Belg., 1895, p. 66; Alluaud, in Grandidier, Hist. Madag., xxi, 1900, p. 219; Schwarz, in Wytsman, Gen. Ins., Elat., 1906, p. 174, no. 12.

Normalement l'insecte est brun foncé, les épaules sont jaunâtres. La variété *a*, Candèze, *l. c.*, est entièrement brun jaunâtre, plus clair sur les élytres.

Loc. Cargados Is. : Establishment I., 28. viii. 1905, 4 exemplaires. Mascareignes. Madagascar. Sainte-Marie-de-Madagascar. Forme typique primitive : Maurice.

IV. *ELATERINAE.*

TABLEAU DES GENRES.

1. Ponctuation du pronotum sur un fond alutacé Aeoloides Schwarz, p. 418.
— Ponctuation du pronotum sur un fond lisse . 2.
2. Troisième article des antennes plus long que le quatrième . . . . . Trelasus, n. g., p. 420.
— Troisième article des antennes moins long que le quatrième . . . . . 3.
3. Quatrième article des tarses notablement moins épais que les précédents . Elastrus Cand., p. 421.
— Quatrième article des tarses aussi épais ou à peu près que les précédents Megapenthes Kiesenw., p. 422. Melanoxanthus Cast., p. 424

Aeoloides Schwarz.

Aeoloides Schwarz, in Wytsman, Gen. Ins., Elat., 1906, p. 109.

Créé comme sous-genre de *Heteroderes* Latreille, 1834 (posthume), avec les espèces à quatrième article des tarses non lamellé, qui y avaient jusque là été introduites. Le genre *Heteroderes* (génotype : *fuscus* Latreille, d'Afrique occidentale) a le quatrième article de tous les tarses nettement lamellé et, parconséquent, appartient à la sous-famille des Conoderinae (Monocrepidiinae). Malgré l'affinité, l'homogénéité des *Aeoloides* et des *Heteroderes*, il n'est pas possible de ne pas tenir compte du caractère tarsal sur quoi repose précisément tout le système de classification adopté encore aujourd'hui. Pour s'y conformer, il faut donc transporter les *Aeoloides* dans la sous-famille des *Elaterinae* (tarses simples).

17. **Aeoloides senex** (Candèze).

Heteroderes senex Candèze, Ann. Soc. Ent. Belg., 1895, p. 60; Kolbe, Abh. Senckenb. Nat. Ges., xxvi, 1902, p. 575; Alluaud, in Grandidier, Hist. Madag., xxi,

1900, p. 215; Schwarz, in Wytsman, Gen. Ins., Elat., 1906, p. 108, no. 37.

Heteroderes complanatus ‡ Fairmaire, Bull. Soc. Ent. France, 1896, p. 222 (non Klug, 1833 *); Kolbe, *op. cit.*, p. 576; Alluaud, *op. cit.*, p. 214, pars.

Heteroderes alluaudi Fleutiaux, in Alluaud et Jeannel, Voy. Afr. orient., Elat., 1919, p. 65.

Pour dissiper le doute qui planait sur l'identité du *H. complanatus* signalé par Fairmaire à Aldabra, je me suis adressé au Professeur Bergroth, qui le lui avait communiqué. Il a bien voulu m'offrir l'exemplaire revenu en sa possession et c'est avec surprise que j'ai constaté qu'il porte une étiquette de ma main. En rassemblant mes souvenirs, je me suis rappelé que Fairmaire m'a fréquemment autrefois confié la détermination d'Elatérides, plus particulièrement de la faune malgache. Je suis donc vraisemblablement la cause de l'erreur dont il a endossé la responsabilité en publiant cette provenance pour la vieille espèce de Klug. C'est à peu près vers la même époque que Candèze a décrit *Heteroderes senex*, si peu différent en apparence du *H. complanatus* par la description, que je n'ai pas eu la pensée de l'en séparer. L'examen des deux types du *H. senex*, dont l'un est dans la Collection Candèze, au Musée de Bruxelles, et l'autre dans la Collection Alluaud, au Museum de Paris, m'a permis d'identifier l'exemplaire d'Aldabra cité par Fairmaire. C'est la même espèce que plus récemment j'ai décrite de l'Ile Pamanzi (Mayotte) sous le nom de *Heteroderes alluaudi*, en le comparant à *H. waltli* Candèze, d'Obock, à cause de sa rotondité et de la saillie épineuse du milieu de la base du pronotum.

En somme, *Aeoloides senex* Candèze (4e article des tarses normal, obliquement tronqué, surtout les antérieurs, mais non lamellé) ressemble assez à *Heteroderes complanatus* Klug (4e article des tarses lamellé, les postérieurs faiblement). Sa forme générale est plus convexe, les taches rougeâtres des élytres analogues, aussi variables, moins visibles. Pronotum plus grand et beaucoup moins rétréci en avant; tubercule de la base plus saillant.

Loc. Aldabra : 4 exemplaires, 1907 (*Thomasset*); Picard

* *Heteroderes complanatus* Klug, 1833, est à rayer de la faune qui nous occupe ici. Il est abondamment répandu à Madagascar, dans toute l'Ile, et y paraît localisé.

I., i. 1909, 2 exemplaires (*Fryer*); 1895 (*Voeltzkow*). Farquhar Atoll : 4 exemplaires, 1905 (*Gardiner*); (*Daruty*, Muséum Paris). Madagascar, nord de l'Ile. Comores. Forme typique primitive : Madagascar, Diégo-Suarez.

Trelasus, n. g.

Oblong, peu convexe. Tête déprimée en avant; bord antérieur arrondi et tranchant. Antennes courtes, dépassant peu la moitié du pronotum, comprimées et dentées, élargies vers le bout, parcourues dans la longueur par une carène obtuse : 2e article très petit, globuleux ; 3e plus long que le 4e; dernier ovale. Pronotum aussi long que large à la base, graduellement rétréci et arrondi en avant, brusquement et fortement déprimé à la base; angles postérieurs longs, aigus, non divergents, bicarénés. Ecusson ovale. Elytres atténués et arrondis à l'extrémité. Sutures prosternales sinueuses et dédoublées. Saillie longue et effilée. Episternes métathoraciques parallèles, de même largeur que les épipleures des élytres. Hanches postérieures peu élargies en dedans et subdentées. Dernier arceau ventral atténué et arrondi au sommet. Tarses plus courts que le tibia correspondant et presque de la même grosseur, subcylindriques, garnis en dessous de poils raides serrés en brosse; griffes simples.

Voisin de *Elastrus* Candèze. Antennes plus courtes, carénées dans la longueur; 3e article beaucoup plus long que le 2e; tarses subcylindriques; 4e article aussi épais que les autres. Ressemble aussi à certains *Megapenthes* comme : *epitrotus* Candèze, de Singapour; *angulosus* et *inconditus* Candèze, des Philippines, desquels il diffère par son front déprimé en avant et tranchant; ses antennes à 3e article plus long que le 4e; ses tarses plus courts et ciliés en dessous.

18. Trelasus antennalis, n. sp.

Long, 9 millim ½. Brun rougeâtre un peu ombré; pubescence jaune, courte, peu apparente. Tête à ponctuation serrée, un peu

Fig. 6.—*Trelasus antennalis*, antenne.

rugueuse. Pronotum très densement et profondément ponctué, plus fortement sur le milieu. Elytres finement et légèrement pointillés, nettement et fortement ponctués-striés; interstries tout

à fait plans. Dessous noirâtre, à ponctuation forte et écartée sur le propectus, plus fine et plus légère sur le métasternum et l'abdomen. Pattes ferrugineuses; fémurs obscurs.

Loc. " Seychelles : Praslin, found between the leaf-bases of a growing Coco-de-mer palm (*Lodoicea*) in the Vallée de Mai, Côtes d'Or Estate, 28. xi. 1908; 1 specimen."

Elastrus Cand.

Elastrus Candèze, Mon. Elat., ii, 1859, pp. 416, 433; Schwarz, in Wytsman, Gen. Ins., Elat., 1906, pp. 110, 113.

Genre malgache établi sur 3 espèces : *anchastinus*, *tepidus* et *sardioderus*; depuis 5 nouvelles de même provenance ont été décrites. Trois autres y ont été introduites, mais il n'est pas certain qu'elles puissent y rester, ce sont : *dolosus* Crotch, 1867, des Açores; *flavipes* MacLeay, 1872, d'Australie; *senegalensis* Candèze, 1881, du Sénégal.

19. Elastrus aldabrensis, n. sp.

Long., 11 millim. Oblong, peu convexe; brun foncé assez brillant, pubescence fauve. Tête large, arrondie en avant; ponctuation peu serrée. Antennes brun clair, subcomprimées, légèrement dentées à partir du 4e article; 2e et 3e petits, subégaux. Pronotum à peu près aussi long que large, peu rétréci en avant, peu convexe, déprimé à la base; ponctuation plus écartée que sur la tête; angles postérieurs subaigus, non divergents, unicarénés. Ecusson oblong, rétréci en arrière, ponctué. Elytres de la largeur du pronotum, rétrécis et arrondis seulement au sommet, légèrement pointillés, ponctués-striés, plus fortement à la base. Dessous de même couleur, ponctué, plus légèrement sur l'abdomen. Prosternum étroit, subparallèle; saillie longue, étroite et effilée, sillonnée sur les bords. Sutures prosternales canaliculées en avant. Episternes métathoraciques parallèles, un peu moins larges que les épipleures des élytres. Hanches postérieures nulles en dehors, brusquement et notablement élargies en dedans à angle droit. Dernier arceau ventral arrondi. Pattes brun clair; tarses plus minces au sommet.

Voisin de *E. anchastinus* Candèze, de Madagascar. Forme plus courte, couleur plus foncée, aspect plus brillant; hanches postérieures plus brusquement élargies.

Loc. Aldabra : Takamaka, xii. 1908, 1 exemplaire (*Fryer*).

Megapenthes Kiesenw.

Megapenthes Kiesenwetter, Nat. Ins. Deutschl. iv, 1858–1863, pp. 229, 253; Candèze, Mon. Elat., ii, 1859, pp. 416, 491; J. Duval, Gen. Col. Eur., iii, 1859–1863, pp. 138, 144; Schwarz, in Wytsman, Gen. Ins., Elat., 1906, pp. 110, 122.

Trichophorus ‡ Mulsant et Godard, Opuse. Ent., ii, 1853, p. 181 (non Serville, 1834); J. Duval, *op. cit.*, pp. 136, 144.

Ce genre est actuellement un vaste magasin où sont entassées près de 200 espèces originaires de tous les points du globe, et dont beaucoup n'y sont pas à leur place.

Il a été fondé sur deux espèces européennes : *Elater lugens* W. Redtenbacher, 1842, et *Elater tibialis* Boisduval et Lacordaire, 1835.

La première, sans aucun doute, serait tout aussi bien, sinon mieux, dans le genre *Trichophorus* Mulsant et Godard, 1853, avec *T. guillebeaui*, d'Europe méridionale, génotype,* ainsi que quelques espèces américaines du nord, qui ont également le front nettement séparé du labre par le rebord antérieur de la tête entier, et les antennes comprimées et dentées, avec les 2e et 3e articles petits, subglobuleux, subégaux.

La deuxième, *M. tibialis*, a un front tout différent; terminé en pointe en avant au dessus d'un épistome large, traversé au milieu par une côte caréniforme obtuse. Antennes subcomprimées, presque filiformes, à 2e et 3e articles petits, subégaux. Les hanches postérieures sont semblables : élargies en dedans et anguleuses. Les tarses également grêles et simples.

Les larves de ces deux espèces sont connues.

ESPÈCES.

Angles postérieurs du pronotum bicarénés *curtus* Cand., p. 422.
Angles postérieurs du pronotum unicarénés *difformis*, n. sp., p. 423.

20. Megapenthes curtus Cand.

Megapenthes curtus Candèze, C.R. Soc. Ent. Belg., 1878 (Elat. Nouv. ii), p. 186; Fleutiaux, Ann. Soc. Ent. France, 1889, p. 142; Candèze, Cat. Méth. Elat., 1891, p. 97.

* Considéré par Candèze, Mon. Elat., iv, 1863, p. 305, comme *Ludius* Latreille, 1825 et 1834, génotype : *Elater ferrugineus* Linné, 1758. Bord antérieur de la tête effacé au milieu.

Je n'ai pas vu d'individus du Siam, d'où l'espèce a été décrite, mais j'en connais de Cochinchine, de Poulo-Pinang, de Pérak, de Singapour, de Bornéo, de Sumatra. Les exemplaires des Séchelles sont plus noirâtres. Schwarz a omis de la mentionner dans le catalogue qui accompagne son " Genera " (Wytsman, Gen. Ins., Elat., 1906, p. 123).

Loc. " SEYCHELLES : Praslin, 1905. 1 specimen (*Gardiner*) ; Mahé, low country, 1 specimen (*Scott*)." Indochine. Malacca. Sumatra. Bornéo. Forme typique primitive : Siam.

21. **Megapenthes difformis,** n. sp. (Pl. XXXIII, figs. 2, 3, ♂ et ♀.)

♂. Long., 6 à 6 millim. ½. Allongé, convexe ; brun-jaunâtre mat, avec la tête souvent et quelquefois le pronotum (sauf à la base) ou les élytres plus ou moins obscurcis ; pubescence jaune peu serrée. Tête large, convexe, fortement ponctuée ; bord antérieur arrondi et rebordé. Antennes minces, subfiliformes, atteignant la moitié du corps ; jaunâtres ; articles à peine épaissis au sommet : 2e très petit ; 3e beaucoup plus long que le précédent, mais plus court que le 4e. Pronotum une fois et demie plus long que large, graduellement et faiblement rétréci en avant, brusquement déprimé à la base ; ponctuation moins forte que sur la tête, bien nette, moins serrée, presque effacée sur la partie déclive en arrière ; angles postérieurs non divergents, aigus, unicarénés. Ecusson acuminé. Elytres insensiblement rétrécis en arrière, arrondis au sommet, superficiellement rugueux, fortement ponctués-striés. Dessous de même couleur, fortement ponctué. Episternes métathoraciques parallèles, plus étroits que les épipleures des élytres. Hanches postérieures peu élargies en dedans, dentées. Dernier arceau ventral arrondi. Pattes assez longues, jaune pâle.

♀. Long., 7½ à 9 millim. Forme générale moins étroite. Antennes et pattes plus courtes et plus minces.

Remarquable par la longueur du pronotum. Peut se comparer à certaines formes de Madagascar, comme *M. flavescens* Candèze, par exemple. Ou à des espèces indiennes : *M. lugubris* Candèze, et *M. crassus* Fleutiaux, pour les différences sexuelles ; il est de couleur claire, d'une taille plus petite, et beaucoup moins rugueux. Sa couleur jaunâtre ou brunâtre rappelle *M. tetricus* Candèze, d'Indochine, mais sa forme est plus étroite et surtout son pronotum beaucoup plus allongé.

Loc. ALDABRA : Takamaka, x.-xi. 1908, 11 exemplaires (*Fryer*).

Melanoxanthus Cast.

Melanoxanthus Castelnau, in Silbermann, Rev. Ent., iv, 1836, tabl. p. 4; Candèze, Mon. Elat., ii, 1859, pp. 416, 510; Schwarz, in Wytsman, Gen. Ins., Elat., 1906, pp. 110, 126.

Elater ‡ Lacordaire, Gen. Col., iv, 1857, p. 187, pars, note 1 (non Linné, 1758).

Il est difficile de trouver une démarcation précise entre les *Melanoxanthus* et les *Megapenthes*. Candèze lui-même traduit son embarras à ce sujet dans le 3e fascicule des "Elatérides nouveaux," 1881, p. 70 (Observation). Il en a été décrit un nombre égal d'espèces, toutes tropicales, aussi disparates que celles du genre *Megapenthes*.

Génotype : *Elater melanocephalus*, Fabricius.

ESPÈCES.

Taille moyenne (7 millimètres environ) :

Couleur jaune dominante. Elytres tronqués au sommet . . . . . *melanocephalus* Fabr., p. 424.

Couleur noire dominante. Elytres entiers au sommet . . . . . *insularis*, n. sp., p. 425.

Taille petite (4 millimètres environ) :

Ponctuation du pronotum ronde, ombiliquée, très serrée . . . . . *frivolus* Cand., p. 426.

Ponctuation du pronotum non ombiliquée, assez écartée . . . . . *puerulus* Cand., p. 427.

22. **Melanoxanthus melanocephalus** (Fabr.).

Elater melanocephalus Fabricius, Spec. Ins., i, 1781, p. 272; Thunberg, Nov. Ins. Sp., iii, 1784, p. 63; Fabricius, Mant. Ins., i, 1787, p. 174; Olivier, Ent., Col., ii, 1790, no. 31, p. 41, t. 4, fig. 36*a*, *b*; Fabricius, Ent. Syst., i, 2, 1792, p. 229; *id.*, Syst. Eleuth., ii, 1801, p. 239; Herbst, Käf., x, 1806, p. 111, t. 168, fig. 10, 10*b*.

Melanoxanthus melanocephalus Germar, Zeitschr. Ent., v, 1844, p. 191; Candèze, Mon. Elat., ii, 1859, p. 512, t. 7, fig. 12, 12*a*; Gerstaecker, Arch. Nat., 1871, p. 54; *id.*, Glied. Fauna Sansib., 1873, p. 148; Candèze, C.R. Soc. Ent. Belg., 1875, p. 123; *id.*, Ann. Mus. Genova, 1878, p. 125; *id.*, *op. cit.*, 1880, p. 194; Fleutiaux, Ann. Soc. Ent. France, 1889, p. 143; Künckel d'Herculais,

in Grandidier, Hist. Madag., xxii, Col. ii, Atlas (1887) 1891, t. 36, fig. 6; Candèze, Ann. Mus. Genova, 1891, p. 777; *id.*, Cat. Méth. Elat., 1891, p. 99; *id.*, Ann. Soc. Ent. Belg., 1895, p. 64; Alluaud, in Grandidier, Hist. Madag., xxi, 1900, p. 217; Fleutiaux, Bull. Soc. Ent. France, 1903, p. 13; Schwarz, in Wytsman, Gen. Ins., Elat., 1906, p. 127, no. 1; Kolbe, Mitt. Zool. Mus. Berlin, v, 1910, p. 26; Fleutiaux, Ann. Soc. Ent. France, 1911, p. 476; *id.*, *op. cit.* 1918, p. 221; *id.*, Bull. Mus. Paris, 1918, p. 217; *id.*, in Alluaud et Jeannel, Voy. Afr. orient., Elat., 1919, p. 69.

Cette espèce, très commune partout sous les tropiques, n'a pas été recueillie par la Percy Sladen Trust Expedition.

Loc. Toutes les régions tropicales universelles. Zanzibar. Madagascar. Mascareignes. Comores. Séchelles (Mahé, 1892, *Alluaud*). Forme typique primitive ; Indes orientales.

23. Melanoxanthus insularis, n. sp.

Long., 7 millim. $\frac{1}{4}$. Allongé, atténué, peu convexe ; noir brillant, avec l'extrême base du pronotum et des élytres jaune, pubescence obscure. Tête abaissée en pointe vers le labre, non rebordée en avant, densement ponctuée. Epistome transversal, rétréci au milieu par la pointe avancée du bord antérieur de la tête. Labre arrondi, ferrugineux, ponctué. Antennes ne dépassant pas la base du prothorax, d'un brun noirâtre, avec les trois premiers articles ferrugineux, peu comprimées et légèrement dentées à partir du 4e article; 2e très petit; 3e plus long que le 2e et plus court que le 4e. Pronotum plus long que large, peu rétréci en avant, sinué sur les côtés, peu convexe, fortement et brusquement déprimé à la base, sillonné au milieu postérieurement; ponctuation plus grosse et moins serrée que sur la tête, plus forte en arrière; angles postérieurs longs, aigus, non divergents, unicarénés. Ecusson oblong, ponctué. Elytres plus étroits que le pronotum, atténués en arrière, arrondis au sommet, un peu rugueux à la base, ponctués-striés, plus légèrement vers l'extrémité. Dessous noir avec le bord antérieur du propectus et ses angles postérieurs rougeâtres. Prosternum étroit, rétréci en arrière, à ponctuation peu serrée; saillie longue, très étroite et parallèle. Propleures à ponctuation plus grosse, plus écartée, s'effaçant en arrière. Episternes métathoraciques parallèles, moins larges que les épipleures des élytres. Métasternum et abdomen à ponctuation peu serrée. Hanches postérieures élargies en dedans, subanguleuses. Abdomen atténué; dernier

arceau ventral arrondi. Pattes jaune clair; tarses minces, les postérieurs plus longs que le tibia correspondant.

Par sa forme allongée et atténuée, il rappelle *M. cuneolus* Schwarz, de Sumatra et de Bornéo. Sa taille est plus grande, son pronotum sinué latéralement, ses élytres rougeâtres seulement à leur extrême base.

Loc. "Seychelles : Silhouette, Mare aux Cochons plateau or forest immediately above, over 1000 feet, ix. 1908, 1 specimen."

24. Melanoxanthus frivolus Cand.

Melanoxanthus frivolus Candèze, Ann. Soc. Ent. Belg., 1900 (Elat. Nouv., vii), p. 90 (posthume).

Le type de Candèze, que j'ai pu examiner grâce à l'obligeance de M. Severin, Conservateur du Musée de Bruxelles, a les élytres presque entièrement jaunâtres; probablement est-ce un cas d'immaturité? La description qu'il en donne est sommaire; je la complète sur les exemplaires des Séchelles qui lui sont absolument conformes, à cela près qu'en général les élytres sont noirs, excepté à l'angle huméral. Ils me paraissent représenter la forme définitive.*

Long., 4 à 4 millim. $\frac{1}{2}$; larg., 1 à 1 millim $\frac{1}{8}$. Tête noire, un peu rougeâtre en avant; ponctuation ombiliquée serrée. Antennes avec les trois premiers articles ferrugineux, les autres noirs. Pronotum noir, plus long que large, peu rétréci en avant, convexe, déprimé à la base; ponctuation ombiliquée serrée; angles postérieurs jaune pâle, aigus, non divergents, unicarénés. Elytres noirs avec une tache jaune pâle aux épaules, rugueux à la base, finement pointillés au delà, fortement ponctués-striés. Dessous noir, sauf aux angles postérieurs des propleures. Pattes jaune flave.

Quelquefois les élytres sont presque entièrement jaunâtres (forme typique de Candèze), mais c'est l'exception.

Espèce omise par Schwarz dans le catalogue de son "Genera."

* Je possède, également de Timor, un individu que je considère comme un co-type; d'autant qu'il porte une étiquette de la main de Candèze : "*Melanox. frivolus*, n. sp., Cdz." Ses élytres sont noirâtres d'une teinte enfumée intermédiaire. Cet insecte lui a été communiqué par moi pendant la dernière année de sa vie, en 1898, en même temps que d'autres Elatérides.

Loc. "Seychelles : Silhouette, Mahé, Praslin. Silhouette : Marc aux Cochons plateau or forest immediately above, ix. 1908. Mahé : Cascade Estate, about 1000 feet, x. 1908–iii. 1909. Praslin : Côtes d'Or Estate, xi. 1908; 1 specimen. 24 examples in all." Form typique primitive : Timor.

25. Melanoxanthus puerulus Cand.

Melanoxanthus puerulus Candèze, Notes Leyd. Mus., xx, 1898, p. 64; Schwarz, in Wytsman, Gen. Ins., Elat., 1906, p. 129, no. 125.

Décrit des Iles de Lutungan et de Lombok (Archipel asiatique). Je le possède également de Célèbes. Peut-être faut-il le rapporter à *M. flavidus* Candèze, 1878, de Malacca, plus anciennement connu? Comme le dit l'auteur, l'espèce varie en ce sens que la couleur flave des taches des élytres envahit plus au moins leur surface qui devient parfois entièrement jaune. Cette dernière forme constitue la variété suivante.

Var. cribricollis Fleut.

Melanoxanthus cribricollis Fleutiaux, Bull. Soc. Ent. France, 1903, p. 14; Schwarz, in Wytsman, Gen. Ins., Elat., 1906, p. 129, no. 6; Kolbe, Mitt. Zool. Mus. Berlin, v, 1910, p. 26.

Décrit comme espèce sur un unique individu pris aux Séchelles (La Digue) par Alluaud (Type : Museum Paris).

Loc. Seychelles, Amirantes, Chagos.

"Seychelles : Silhouette, Mahé, Long I., Anonyme I., La Digue. Silhouette : low country, including some specimens beaten from flowers of *Tournefortia argentea* on the beach at Grande Barbe, viii. 1908. Mahé : low country near Port Glaud, xi. 1908, etc. Long I., vii. 1908. Anonyme I., i. 1909. Like *Cardiophorus lutosus* (see p. 415) this is one of the species found among the flowers and foliage of the wild trees (e. g. *Scaevola*, *Tournefortia*, *Calophyllum*, etc.) which fringe the coasts in many places." La Digue : 1892 (*Alluaud*). Amirantes : Poivre I., 10. x. 1905, 2 exemplaires (*Gardiner*). Chagos : Peros Banhos Atoll, 25. vii. 1905, 1 exemplaire (*Gardiner*). Forme typique primitive : Iles de Lutungan et de Lombok.

V. *DICREPIDIINAE.*

Psephus Cand.

Psephus * Candèze, Mon. Elat., ii, 1859, pp. 9, 19; Schwarz, in Wytsman, Gen. Ins., Elat., 1906, pp. 61, 79.

Le genre est composé de 172 espèces environ, presque toutes africaines; quelques-unes seulement habitent l'Indo-Malaisie. Une seule se rencontre à la fois sur le continent Africain, à Nossi-Bé et aux Comores.† Enfin la suivante est propre aux Séchelles.

26. Psephus alluaudi Fleut.

Psephus alluaudi Fleutiaux, Bull. Soc. Ent. France, 1903, p. 13; Kolbe, Mitt. Zool. Mus. Berlin, v, 1910, p. 26.

Espèce décrite sur un unique exemplaire pris par Alluaud à Mahé des Séchelles (Type : Museum Paris).

Long., 9½ à 13 millim. Bord antérieur de la tête saillant, peu éloigné du labre. Sutures prosternales canaliculées tout à fait en avant. Hanches postérieures sinueuses. Deuxième et troisième articles des tarses longuement et largement lamellés.

Dans la description originale, je l'ai comparé à *P. ineptus* Candèze, d'Afrique orientale. Depuis, j'ai reçu *P. philippinensis* Candèze, auquel il ressemble davantage. Il en diffère cependant par le 3e article des antennes subégal au suivant; le pronotum un peu moins long, moins convexe, ses angles postérieurs non divergents.

Omis par Schwarz dans le catalogue de son " Genera."

Loc. " Seychelles : Mahé, Praslin. Mahé, 4 specimens; near Morne Blanc, about 1000 feet, x.–xi. 1908, and Cascade Estate, about 1000 feet, i. 1909. Praslin : 1905, 5 examples (*Gardiner*) : xi. 1908, Côtes d'Or Estate, 1 specimen." Mahé, " auf Kulturboden " (*Brauer*). Mahé, 1892 (*Alluaud*). Forme typique primitive : Mahé des Séchelles.

* Le nom de *Psephus* (MacLeay) employé par Kirby et Spence, Introd. Ent., iii, 1826, p. 678, comme s'appliquant à un coléoptère-lamellicorne (*Melolontha chrysomeloides* Schrank), n'a pas été décrit. Quoiqu'il en soit, il est synonyme d'*Ochodaeus*, genre fondé antérieurement par Serville, Encycl. Méthod., Ins., x, 1825, p. 360, pour la même espèce (*chrysomelinus* Fabricius).

† *Psephus bucculatus* Candèze, 1859.

VI. *PACHYDERINAE.*

Le nom de Pachyderinae doit remplacer celui de Eudactylinae employé jusqu'à présent: *Eudactylus* Sallé, 1855 * étant primé par *Pachyderes* Guérin, 1829.

TABLEAU DES GENRES.

Taille moyenne (14 millimètres). Antennes comprimées. Angles postérieurs du pronotum divergents. Premier article des tarses postérieurs moins long que les autres ensemble . GONODYRUS, n. g., p. 429.

Taille petite (4 millimètres). Antennes filiformes. Angles postérieurs du pronotum non divergents. Premier article des tarses postérieurs aussi long que les autres réunis . . . . DACTYLOSIMUS, n. g., p. 430.

GONODYRUS, n. g.

Allongé, subparallèle, peu convexe. Tête petite, arrondie en avant; bord antérieur tranchant; épistome horizontal, parallèle. Labre petit. Mandibules courtes et robustes. Antennes ne dépassant pas la base du prothorax, très comprimées et élargies vers le bout: 2e article petit; suivants beaucoup plus longs et graduellement élargis; dernier oblong. Pronotum aussi long que large, convexe au milieu, sinué sur les côtés; angles postérieurs courts, aigus, très divergents, subcarénés au milieu. Ecusson oblong. Elytres relativement longs, arrondis à l'extrémité, profondément ponctués-striés. Prosternum parallèle, de la même largeur que les propleures à la moitié de leur longueur; saillie longue, parallèle. Sutures droites, sillonnées dans toute leur longueur. Episternes métathoraciques parallèles, un peu moins larges que les épipleures des élytres. Hanches postérieures très peu et graduellement élargies en dedans. Dernier arceau ventral triangulaire, terminé en pointe arrondie. Pattes minces; premier article des tarses postérieurs aussi long que les trois suivants réunis; 2e et 3e triangulaires, fendus au milieu au sommet, le 3e un peu plus large; 4e également large, triangulaire, largement évidé en dessus dans toute sa longueur pour recevoir le suivant; 5e mince, épaissi au sommet, dépassant le précédent de la moitié de sa longueur; griffes simples.

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* En outre, je propose de changer en *Tyleudacus*, le nom de: *Eudactylus* ‡ Sallé (non Fitzinger, Reptile).

Se rapproche de *Melanthoides* Candèze, par la conformation des tarses; il s'en distingue toutefois par le bord antérieur de la tête moins saillant, les antennes comprimées, les sutures prosternales parallèles et sillonnées, la saillie également parallèle, les hanches postérieures graduellement et faiblement élargies en dedans. A un peu l'aspect extérieur de certains *Dorygonus* Candèze.

27. Gonodyrus tarsalis, n. sp.

Long., 14 millim. $\frac{1}{2}$. Entièrement noir peu brillant. Tête peu convexe, densement et fortement ponctuée, rugueuse en avant.

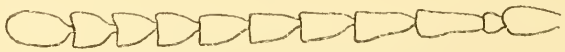


Fig. 7.—*Gonodyrus tarsalis*, antenne.

Pronotum fortement et densement ponctué. Elytres rugueux, profondément ponctués-striés. Dessous plus finement ponctué, très légèrement sur le métasternum et surtout sur l'abdomen.

Loc. "Seychelles : Silhouette, Mare aux Cochons, ix. 1908; 1 specimen (*Gardiner*)."

Dactylosimus, n. g.

Oblong, elliptique. Tête peu convexe en avant, arrondie et rebordée. Antennes filiformes, dépassant la base du prothorax (♂), ou plus courtes (♀); 3e article plus long que le 2e et moins long que le 4e. Pronotum plus long que large, peu rétréci en avant, peu convexe, déprimé en arrière; angles postérieurs non divergents, non carénés. Ecusson oblong. Elytres ovales, convexes, atténués et séparément arrondis au sommet. Sutures prosternales très finement rebordées. Saillie longue et effilée, abaissée au delà des hanches antérieures. Cavité mésosternale horizontale, à bords simples. Episternes métathoraciques parallèles, plus étroits que les épipleures des élytres. Hanches postérieures obliques, graduellement rétrécies en dehors, contiguës au milieu sur toute leur largeur. Abdomen atténué, légèrement comprimé; dernier arceau arrondi. Pattes minces; premier article des tarses postérieurs aussi long que tous les autres ensemble; 2e de la longueur des deux suivants réunis; 3e triangulaire, creusé en dessus; 4e court, également creusé en dessus et dilaté en dessous; ongles petits.

Par la conformations les tarses, ce genre se rapproche de *Melanthoides* et *Simodactylus* Candèze.

28. **Dactylosimus dorsalis**, n. sp. (Pl. XXXIII, fig. 4.)

Long., 4 à 4 millim. $\frac{1}{4}$. Noir varié de jaune; pubescence jaune assez longue. Tête plus ou moins jaune sur la partie antérieure; ponctuation large très superficielle, nettement ombiliquée. Antennes plus ou moins obscures, jaunâtres à la base. Pronotum jaunâtre aux angles antérieurs et postérieurs sur une étendue variable couvrant quelquefois les bords latéraux; ponctué comme la tête et terne comme elle. Elytres peu brillants, jaunes à la base, largement bordés latéralement d'une bande de même couleur parfois interrompue dans la moitié postérieure; fortement ponctués-striés; interstries pointillés. Dessous également noir varié de jaune. Pattes jaune pâle.

Récolté en abondance.

Loc. SEYCHELLES : Silhouette, Mahé.

"Silhouette : Mare aux Cochons or forest immediately above, over 1000 feet, 2 specimens, ix. 1908. Mahé : high forests of Morne Blanc and Morne Pilot, a long series, including a number from the damp forest at the summit of the latter mountain, over 2000 feet, xi. 1908; country above Port Glaud, 500–1000 feet, 5. xi. 1908, 1 example; forest between Trois Frères and Morne Seychellois, 1500–2000 feet, xii. 1908; slopes of Morne Seychellois, about 2000 feet, ii. 1909; forest above Cascade, 1000–2000 feet; Mare aux Cochons district, 1500–2000 feet, i.–ii. 1909. There are 58 examples in all, collected exclusively in the forests at high altitudes, up to the highest and dampest zones of forest : only two specimens were got in Silhouette in August and September, but from October to February the insect was abundant in the high forests of Mahé. *Dactylosimus dorsalis*, *Conoderus gracilipes*, and *C. dimidiaticollis*, were all obtained in large numbers in the endemic mountain-forests by beating and sweeping foliage of low trees and bushes."

VII. *PHYSORHININAE.*

PORTHMIDIUS Germ.

PORTHMIDIUS Germar, Fauna Ins. Eur., xxiv, 1848, p. 7; Candèze, Mon. Elat., ii. 1859, pp. 387, 395; J. Duval, Gen. Col. Eur., iii, 1859–1863, pp. 138, 144; Schwarz, in Wytsman, Gen. Ins., Elat., 1906, pp. 131, 132.

Anchastus Leconte, Trans. Amer. Philos. Soc., x, 1853, pp. 422, 459; Lacordaire, Gen. Col., iv, 1857, pp. 167, 176.
Crepidotritus Leconte, Classif. Col. N. Am., 1861, p. 167.
Elater Lacordaire, *op. cit.*, p. 171, pars.

Bord antérieur de la tête carèné, éloigné du labre. Epistome assez large. Antennes subfiliformes; 3e article plus court que le 4e. Hanches postérieures brusquement et notablement élargies en dedans. Troisième article des tarses lamellé; 4e très petit.

Parmi les 130 espèces placés dans le genre *Anchastus* par Candèze, par Schwarz et par moi-même, un certain nombre devront faire partir du genre *Porthmidius*. D'autres à commencer par l'espèce européenne *acuticornis* Germar,* correspondent au genre *Brachycrepis* Leconte, 1853 (Antennes dentées; 3e article égal ou plus long que le 4e). Champion déjà en a distrait quelques espèces de petite taille de l'Amérique intertropicale, qui sont entrées dans son genre *Anchastomorphus*, 1895. *Candezella* Szombathy, 1910, est, je pense, une forme sous-générique de *Porthmidius*, particulière à la Nouvelle-Guinée.

ESPÈCES.

Ponctuation du pronotum très superficielle et écartée . . . . . *flavescens*, n. sp., p. 432.
Ponctuation du pronotum assez profonde et assez serrée . . . . . *solitarius*, n. sp., p. 433.

29. **Porthmidius flavescens**, n. sp.

Long., 3½ à 5 millim. ½. Oblong, peu convexe; brun-jaunâtre plus ou moins clair, parfois obscurci sur les élytres, sauf à l'extrême base; peu brillant; pubescence jaune pâle assez longue. Tête étroite, arrondie et rebordée en avant; ponctuation très superficielle, ombiliquée, peu serrée. Epistome moins long que le labre. Antennes atteignant la moitié du corps, ou plus courtes (♀), fines, subfiliformes, entièrement jaune pâle ou enfumées à partir du 4e article; 3e plus long que le 2e et plus court que le 4e. Pronotum aussi long que large, peu rétréci en avant, légèrement arrondi sur les côtés, peu convexe, déprimé à la base, marqué de deux impressions légères sur le bord postérieur, près des angles; ponctuation large et très superficielle, peu serrée, ombiliquée sur la partie antérieure, simple et écartée vers la base; angles postérieurs aigus, non divergents,

* Kiesenwetter, Nat. Ins. Deutschl., 1858–1863, p. 350; J. Duval, Gen. Col. Eur., iii, 1859–1863, p. 137.

unicarénés tout près du bord latéral; bord externe entièrement caréné. Ecusson oblong, subarrondi, ponctué. Elytres peu convexes, de la largeur du pronotum à la base, arrondis et rétrécis dans la partie postérieure, fortement ponctués-striés; interstries pointillés. Dessous de même couleur. Propectus éparsement ponctué. Prosternum très peu rétréci à la base; sutures simples, légèrement arquées. Métasternum et abdomen éparsement ponctués. Episternes métathoraciques parallèles, aussi larges que les épipleures des élytres. Hanches postérieures très fortement élargies en dedans, nulles en dehors. Dernier arceau ventral triangulaire, arrondi au sommet. Pattes entièrement jaune pâle.

Peut se comparer à *P.* (*Anchastus*) *sericeus* Candèze, répandu dans toute la région indo-malaise. Mais la ponctuation variolée de la tête et du pronotum est très particulière; les angles postérieurs du pronotum sont unicarénés, tandis qu'ils sont bicarénés dans l'espèce de Candèze.

Loc. SEYCHELLES : Mahé, Félicité, Marie Anne.

" Mahé : forest at summit of Morne Blanc, nearly 2000 feet, 24. x. 1908, 1 example; Mare aux Cochons district, 1500–2000 feet, i.–ii. 1909; forest above Cascade, 1000–2000 feet, ii.–iii. 1909. Félicité : from forest, xii. 1908, 1 specimen. Marie Anne : from forest, 3. xii. 1908, 3 examples. There are 14 specimens in all; as the records show, this species occurred not only in the high, damp, endemic forests of Mahé, but also in the much drier type of forest, composed largely of different species of trees, near sea-level on Félicité and Marie Anne."

30. Porthmidius solitarius, n. sp.

Long., 7 millim. Oblong, peu convexe; brunâtre, pubescence jaune pâle, assez longue. Tête arrondie et rebordée en avant, peu convexe; ponctuation ombiliquée, nette, assez serrée. Antennes subfiliformes, d'un brun jaunâtre. Pronotum à peu près aussi long que large, arrondi sur les côtés, rétréci en avant, peu convexe, déprimé à la base; ponctuation ombiliquée bien marquée et assez serrée en avant, simple et plus écartée en arrière; angles postérieurs aigus, non divergents, unicarénés tout près du bord latéral; bord externe entièrement caréné. Ecusson oblong, finement ponctué. Elytres peu convexes, de la même largeur que le pronotum à la base, arrondis et rétrécis dans la partie postérieure, fortement ponctués-striés; interstries pointillés. Dessous de même couleur. Pattes jaune pâle; tarses un peu rougeâtres.

Même forme et même coloration que le précédent; plus grand; ponctuation de la tête mieux marquée; celle du pronotum plus profonde et plus serrée; stries des élytres plus profondes.

Loc. " Seychelles : Silhouette, Mare aux Cochons, ix. 1908; 1 example."

VIII. *CONODERINAE.*

Le nom de Conoderinae doit être substitué à celui de Monocrepidiinae; le genre *Conoderus* ayant été décrit avant *Monocrepidius.*

Conoderus Eschsch.

Conoderus Eschscholtz, in Thon, Ent. Archiv., ii, 1, 1829, p. 31.

Monocrepidius Eschscholtz, *op. cit.*, p. 31, pars; Lacordaire, Gen. Col., iv, 1857, pp. 167, 177, pars; Candèze, Mon. Elat., ii, 1859, pp. 180, 187; Schwarz, in Wytsman, Gen. Ins., Elat., 1906, pp. 89, 93.

Ce genre nombreux comprend près de 350 espèces répandues dans les pays chauds, principalement dans l'Amérique du Sud et dans l'Australie. Il est de ceux qui appellent une révision nécessitée par la grande diversité de formes qu'il contient à l'heure actuelle. Les genres *Dorygonus* Candèze, 1859, et *Phedomenus* Candèze, 1889, tous deux particuliers à Madagascar, apparaissent comme une subdivision locale du genre *Conoderus.*

ESPÈCES.

Ponctuation du pronotum assez forte, nette et profonde . . . . . *gracilipes*, n. sp., p. 434.

Ponctuation du pronotum extrêmement fine, à peine distincte, et écartée . . . *dimidiaticollis*, n. sp., p. 435.

31. Conoderus gracilipes, n. sp. (Pl. XXXIII, fig. 5.)

Long., 4¼ à 5 millim. ¾. Allongé et convexe; jaune maculé de noir, pubescence jaune. Tête variant du jaune au noir, peu convexe, densement ponctué; bord antérieur arrondi, rebordé et saillant. Epistome assez large. Labre noir, transverse, arrondi, bombé, ponctué. Antennes ne dépassant pas la base du prothorax, filiformes, jaunes à la base, plus ou moins noirâtres au delà du 4e article; 2e petit; 3e un peu plus long; 4e aussi long que les deux précédents réunis; suivants subégaux. Pronotum plus long que large, convexe, subparallèle, très peu rétréci en avant; noirâtre

ou noir, plus ou moins jaune sur les bords, sillonné au milieu en arrière; ponctuation moins grosse et moins serrée que sur la tête; angles postérieurs aigus, non divergents, carénés. Ecusson triangulaire, noir ou jaunâtre, finement ponctué. Elytres allongés, à peine aussi larges que le pronotum, convexes, conjointement arrondis au sommet, finement rugueux, fortement ponctués-striés; normalement jaunes, avec la suture en partie, une tache subhumérale, une autre au dessous de la moitié et une dernière avant l'extrémité, noires; ces taches disparaissent parfois partiellement ou s'étendent plus ou moins, au point de couvrir presque toute la surface. Dessous jaune ou noirâtre. Prosternum étroit, parallèle, légèrement ponctué; saillie longue et effilée. Sutures fines. Propleures parsemés de gros points. Métasternum à ponctuation fine et serrée au milieu, plus grosse et moins dense sur les côtés. Episternes rétrécis en arrière. Epipleures des élytres parallèles, plus larges que les épisternes. Hanches postérieures étroites, peu élargies en dedans, légèrement anguleuses. Abdomen à ponctuation fine au milieu, un peu plus grosse sur les côtés; dernier arceau ventral triangulaire, arrondi au sommet. Pattes fines, d'un jaune très pâle; 4e article des tarses prolongé en dessous; ongles petits et simples.

Ressemble à *C.* (*Monocrepidius*) *minusculus* Schwarz, de Sumatra, Bornéo, Philippines. Taille plus grande; pronotum plus convexe, moins rétréci en avant, sans tache sur le disque; taches des élytres mieux marquées, celle du milieu placée plus bas.

Il en a été recueilli de nombreux exemplaires.

Loc. Seychelles : Silhouette, Mahé.

" Silhouette : near Mont Pot-à-eau, about 1500 feet, viii. 1908; Mare aux Cochons and forest above, over 1000 feet, ix. 1908. Mahé : found between October 1908 and February 1909 fairly generally distributed in the forests between 1000 and 2000 feet; Morne Blanc, Mare aux Cochons district, and Cascade. Forty examples in all, exclusively from the endemic forests at high altitudes (see note under *Dactylosimus dorsalis*, p. 431). One specimen, from the forest above the Silhouette Mare aux Cochons, was bred from a stick of an endemic tree, the ' Bilimbi marron ' (*Colea pedunculata*)."

32. **Conoderus dimidiaticollis,** n. sp. (Pl. XXXIII., fig. 6.)

Long., 3 à 4 millim. Allongé, atténué en arrière; peu brillant. Tête noirâtre, convexe, sinuée et rebordée en avant, très finement et éparsement pointillée. Epistome jaune, plus étroit que le labre.

Celui-ci également jaune, arrondi. Antennes atteignant à peu près la base du prothorax, moniliformes, noirâtres au milieu, jaunes à la base et au sommet; 3e article plus long que le 2e et plus court que le 4e. Pronotum assez grand, plus long que large, à peine rétréci en avant, légèrement sinué sur les côtés, peu convexe, déprimé en arrière; noir dans la partie antérieure, jaune à la base, sillonné au milieu en arrière; ponctuation très fine et écartée; angles postérieurs déprimés, non divergents, aigus, non carénés. Ecusson subtriangulaire. Elytres peu convexes, brusquement déprimés à la base, aussi larges en avant que le pronotum, atténués en arrière, arrondis au sommet, jaunes, noirâtres aux épaules et à l'extrémité, ponctués-striés; interstries finement pointillés. Dessous jaune maculé de noir sur la partie antérieure des propleures et le pourtour de l'abdomen. Propectus presque lisse ou légèrement pointillé. Prosternum rétréci en arrière; saillie longue et effilée. Sutures fines, sinuées. Propleures sillonnées au milieu en avant. Episternes métathoraciques faiblement rétrécis en arrière. Epipleures des élytres parallèles, plus larges que les épisternes. Hanches postérieures sinuées, rétrécies en dehors. Métasternum et abdomen convexes, éparsement pointillés. Dernier arceau ventral arrondi. Pattes fines, jaune pâle.

La femelle est plus robuste.

Espèce de coloration assez variable : tantôt entièrement jaune pâle; tantôt avec la tête, la suture des élytres dans la première moitié et leurs bords externes en arrière, ainsi que leur extrémité, noirâtres.

Récolté en grand nombre.

Loc. Seychelles : Silhouette, Mahé.

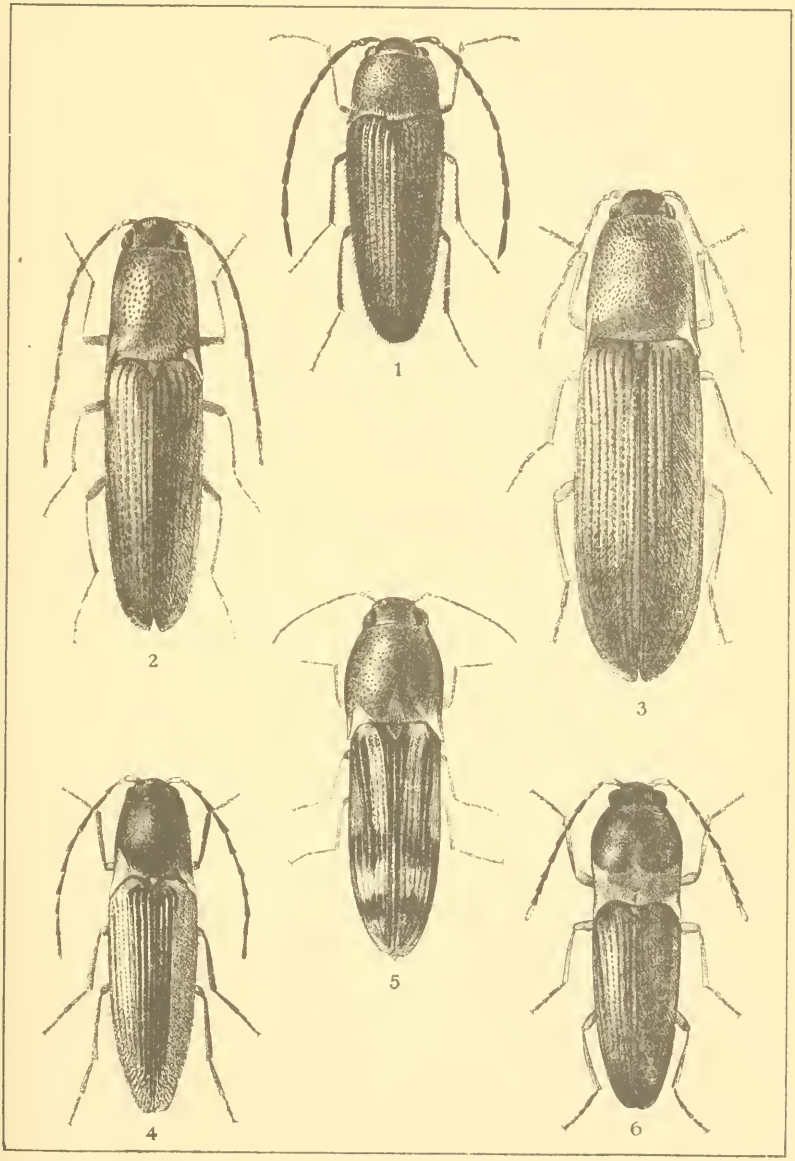
" Silhouette : high forest above Mare aux Cochons, about 1500–2000 feet, ix. 1908, 5 specimens. Mahé : found between October 1908 and March 1909 abundantly in the forests, between about 1000 and 2000 feet : Morne Blanc and Morne Pilot; behind Trois Frères; above Cascade; and Mare aux Cochons district, where a particularly long series (about 56 specimens) was collected, 26. i.–2. ii. 1909. Eighty-one examples in all, exclusively from the damp endemic forests at high elevations (see note under *Dactylosimus dorsalis*, p. 431)."

Explanation of Plate XXXIII.

[*See Explanation facing the* Plate.]

Explanation of Plate XXXIII.

Fig. 1. *Prolycaon longicornis*, gen. et sp. nov. (Seychelles), × 13.
2. *Megapenthes difformis*, sp. nov. (Aldabra) ♂, × 9.
3. „ „ „ „ ♀, × 9.
4. *Dactylosimus dorsalis*, gen. et sp. nov. (Seychelles) ♂, × 11.
5. *Conoderus gracilipes*, sp. nov. (Seychelles), × 10.
6. *Conoderus dimidiaticollis*, sp. nov. (Seychelles) ♂, × 14.



Miss O.F Tassart, del. *Reid, Litho. Edin.*

MELASIDÆ AND ELATERIDÆ FROM THE SEYCHELLES AND ALDABRA.

XVI. *On the Larva and Pupa of the Genus* Sabatinca (*Order* Lepidoptera, *Family* Micropterygidae). By R. J. Tillyard, M.A., Sc.D.(Cantab.), D.Sc.(Sydney), C.M.Z.S., F.L.S., F.E.S., Entomologist and Chief of the Biological Department, Cawthron Institute, Nelson, N.Z.

(Read October 18th, 1922.)

(Plate XXXIV, Text-figures 1–4).

The Lepidoptera Homoneura at the present time contain no less than seven families, divisible into two superfamilies as follows :—

Superfamily MICROPTERYGOIDEA :—Micropterygidae, Eriocraniidae and Mnesarchaeidae.
Superfamily HEPIALOIDEA :—Hepialidae, Prototheroidae, Anomosetidae and Palaeosetidae.

Of these, the life-histories of only the Eriocraniidae and Hepialidae are known at all fully. The late Dr. T. A. Chapman, F.R.S., repeatedly reared the larvae of *Micropteryx*, but never succeeded in getting them to pupate, so that the pupa of this family remains unknown to the present day. (See these Transactions, 1894, pp. 335–344 and pl. vi.)

While working on the Micropterygoidea in 1918, I got into touch with Mr. Alfred Philpott, F.E.S., then living at Invercargill, N. Z., and told him that it was probable that the larvae of *Sabatinca* were moss-feeders, as Dr. Chapman had succeeded in getting species of *Micropteryx* to oviposit on moss, and the larvae evidently fed on it. Mr. Philpott had been studying the habits of a species of *Sabatinca* near his home (*S. barbarica* Philp.), and at once became interested in this question. He sent me a large consignment of damp moss collected from the place where the adults had been observed resting. This was searched through most carefully, but no larvae were found in it. About the same time, Mr. Philpott wrote to me as follows :—

" Last year, while examining moss for early stages of

Sabatinca, I found what I supposed to be a beetle larva. I put it aside and had almost forgotten it when, on re-reading one of your letters, I noticed your remark that the Palaeontinidae (Jurassic fossil Lepidoptera) were supposed to be closely related to the Limacodidae. Now the little larva referred to is somewhat of the Limacodid type. It has the characteristic spines which some of that family have; the prolegs are absent or vestigial; the thoracic legs feeble, and the head (apparently) retractile. We have no Limacodidae in N. Z.; therefore the larva may possibly be that of *Sabatinca*. I am sending it to you, and expect you will tell me it is the larva of a Malacoderm beetle or some other common thing."

The larva (in spirit) duly came to hand, and I recognised it at once as a Micropterygid larva about half-grown, by comparison with Dr. Chapman's well-known description and also with first instar larvae of *Micropteryx* which he had kindly sent me. The only species of the family occurring in Mr. Philpott's immediate neighbourhood being *Sabatinca barbarica* Philp., it was a reasonable supposition that the larva belonged to that species.

In December 1919 I met Mr. Philpott at Queenstown, Lake Wakatipu, and together we climbed Ben Lomond and searched in moss for larvae of *Sabatinca*, without success. Later on, in February 1920, while I was in Dunedin, Mr. Philpott sent me two well-grown larvae of *S. barbarica*, which he had found in moss brought from Seaward Bush in Southland on February 10. One of these was dead, but the other was alive, and was kept alive for some time, finally dying from the heat of the Tropics while I was on my way to England via Suez, in May 1920. A third specimen found by Mr. Philpott at the same time was kept alive by him for nearly two months. Although carefully watched, it was never seen to feed, and for the most part remained quite inactive. This larva was unfortunately lost on April 1, 1920, during Mr. Philpott's removal to Nelson, where he had accepted the post of Assistant Entomologist at the Cawthron Institute, shortly after my own appointment to the Biological Department of the same Institute.

Mr. Philpott says of this larva : " Its appearance is protective. To the naked eye the dark lateral margin looks like the midrib of a leaf, and makes the larva easy to be passed over; also the lateral corrugations help to give

it a moss-leaf effect. The spines are similar to the spine-like projections on the edges of the moss-leaves."

It should be noted here that the supposed "moss" on which this larva was found proved on closer examination to be a kind of liverwort. Unfortunately we have not succeeded in getting any one to name it for us, though it belongs to a type of liverwort not at all uncommon in N. Z. Later on, cocoons of *Sabatinca incongruella* Walk. were found on a closely related species of liverwort near Nelson. It would thus appear that the larvae of the genus *Sabatinca* are in reality liverwort-feeders, not moss-feeders. It is possible that the larvae of *Micropteryx* also feed upon liverwort, and that Dr. Chapman's inability to rear them completely on moss was due to his failing to discover this fact.

Two of the larvae sent to me by Mr. Philpott were exhibited by me at the meeting of the Entomological Society of London, together with two slides prepared from the third specimen (these Proceedings, p. liv, 1920). They were also exhibited later in the year at an entomological meeting in Honolulu, T. H. (Proc. Haw. Ent. Soc., IV, No. 3, Sept. 1921).

While I was away from Nelson during the spring of 1920 (Sept. to Dec.) Mr. Philpott was in charge of the entomological work there. During a series of trips to the Dun Mountain he found, at about 2500 feet elevation, several species of *Sabatinca*, and collected from time to time considerable amounts of moss and liverwort, some of which was carefully examined for larvae, without success, and some was kept moist in a series of glass lamp-chimneys, in the hope that something of interest might be bred from it. I returned to Nelson on December 11, 1920. On December 30 we observed a freshly emerged female of *Sabatinca incongruella* Walk. in one of these jars which contained liverwort. An examination of the liverwort disclosed the empty cocoon attached low down at the side of a stem of liverwort in a very moist position, and the pupal skin was found also, half-way or more out of the cocoon. This skin was treated with 10 per cent. KOH, and expanded enough to allow of careful drawings of the head to be made, as well as giving a fairly clear idea of what the living pupa must have been like.

Publication of these results was delayed from time to time, in the hope that further discoveries might enable us to complete the life-history and present it as a complete

study. So far, however, nothing more has been added to our knowledge of these wonderful little moths. I have, therefore, decided to publish the results to date, and hope that the life-history may be completed later by the discovery of the eggs, early larval stages, and living pupa.

Description of the Larva of Sabatinca barbarica *Philp.*

(Plate XXXIV, Text-figure 1.)

Total length of the well-grown larva (probably full-fed) with head retracted, 4·0 mm. *Greatest breadth*, across 4th and 5th abdominal segments, 2·0 mm. Width of transverse pouch into which head is retracted, 0·4 mm.

General shape broadly oval, widest at 4th and 5th abdominal segments. In transverse section across any body segment, the shape is hexagonal (Text-fig. 1, *g*), the six sides of the hexagon being of approximately equal length. The ventral side is flattened, the two latero-ventral sides slightly convex, but the two latero-dorsal sides and the dorsal side itself are all definitely concave, the large specialised macrotrichia (dolichasters) projecting from their angles. The dorsal part of the 4th abdominal segment is narrowed and darkened, so that the larva appears to be divided by this constriction into two approximately equal and similar halves fore and aft from this segment, and it is not easy to tell the head end from the anal end when the head is retracted. The back of the larva is raised up as a high convex ridge on either side, so that the lateral view is greatly arched, as shown in Plate XXXIV, fig. 3.

General colour creamy whitish, with very complicated markings of pale and dark greenish brown. The dark markings are confined for the most part to the latero-dorsal sides of the abdominal segments and across the dorsal side of the 4th abdominal segment. The concave dorsal side, between the two high ridges, is for the most part (except on segment 4) irregularly mottled with paler olive green, as shown in Plate XXXIV, fig. 1. The latero-dorsal sides of abdominal segments 2–7 show a delicate whitish line dividing the dark area on each, with signs of very fine transverse whitish ribs projecting from it on either side. The latero-ventral and ventral sides are pale creamy, except on the thorax, which is slightly darkened.

Head very small, completely retractile into a pouch or pocket of the prothorax. When everted, it is pale in colour, except the mandibles and maxillae, which are dark brownish. The tentorial

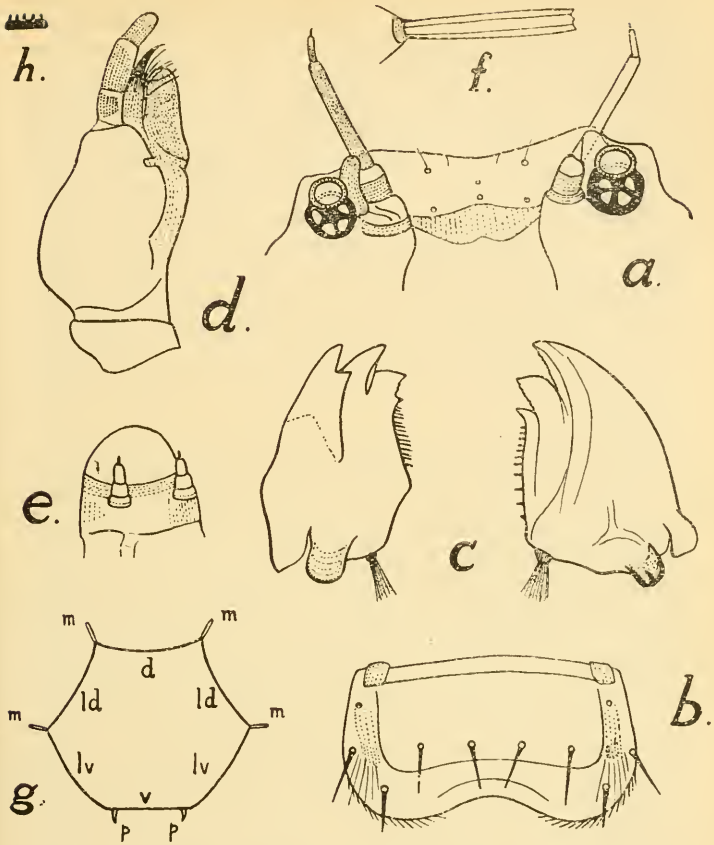


Fig. 1.—*Sabatinca barbarica* Philp., last larval instar, 10 per cent. KOH preparations cleared and mounted in Canada Balsam (except *g*). *a.* Head, showing antennae and five-faceted compound eyes (× 87); the left antenna is pushed up out of its socket basally, giving almost the appearance of an extra basal segment. *b.* Labrum-epipharynx (× 167). *c.* Mandibles, viewed from inner or ventral side (× 167). *d.* Maxilla (× 167). *e.* Labium (× 167). *f.* A single specialised macrotrichion (dolichaster) from 1st abdominal segment (× 87). *g.* Diagrammatic transverse section through an abdominal segment of the larva: *d*, dorsal, *ld*, latero-dorsal, *lv*, latero-ventral and *v*, ventral sides: *m*, macrotrichia, *p*, position of abdominal walking leg. *h.* Dorsal comb with five teeth, from 4th abdominal segment (× 167).

structures can be seen through the pale skin by transmitted light in the dead larva. *General shape* oval, with projecting labrum and clypeus, fairly broad frons, epicranium and occiput. *Antennae* (Text-fig. 1, *a*) placed very wide apart, slender, 0·3 mm. long, composed of three segments, of which the 1st is short and stout, the 2nd long and slender, the 3rd short and very slender, ending in a terminal sensory hair. *Compound eyes* (Text-fig. 1, *a*) present, situated just exteriorly to the antennae. Each compound eye consists of five facets, of which the four posterior are placed very close together to form four-fifths of a complete circle, each facet being in the shape of a sector of that circle, while the anterior one is much larger, circular in form, and projects outwards as a larger hemispherical lens, so as to break the completeness of the contour of the circle. There is no sign of the sixth or ventral eye-element of other Lepidopterous caterpillars. True *ocelli* are altogether absent, as in almost all insect larvae.

Mouth-parts :—*Labrum epipharynx* (Text-fig. 1, *b*) broad, excised in the middle of its anterior margin, well rounded on either side of the excision; it carries eight strong sensory setae and some finer hairs. *Mandibles* (Text-fig. 1, *c*) asymmetrical, stout, fairly short, the right mandible with two double teeth separated by a deep incision, the left mandible with three single teeth, of which the apical one is the largest, the middle one slightly smaller, and the third very much smaller; each mandible also carries, below the toothed area, a longish edge armed with short, stiff bristles. *Maxillae* (Text-fig. 1, *d*) with short cardo, large, swollen stipes, prominent three-segmented palp, slender sharply pointed galea, and broader, rounded lacinia; the galea carries a few prominent hairs. *Labium* (Text-fig. 1, *e*) consisting of a broad basal portion (either the mentum or perhaps the fused submentum and mentum), from which projects a broadly rounded inner lobe and two small palps; these latter appear at first sight to be only two-segmented, but closer examination shows a very small ring-like basal segment in addition; the rather slender terminal segment ends in a short sensory seta. No definite spinneret apparatus could be discovered.

Thorax :—*Prothorax* narrower than the other segments, but longer than the two following thoracic segments. It carries a sharply defined anterior ridge, which marks off an anterior declivity carrying the head-pouch, from a posterior portion of normal form, which carries the spiracles. *Mesothorax* shorter and somewhat wider than prothorax, its posterior border strongly convex dorsally. *Metathorax* again somewhat shorter and wider than mesothorax. *Legs* very short and small, showing only two definite segments and a terminal claw; in correlation with the widening of the thoracic segments from

before backward, the three successive pairs of legs are placed slightly further apart from before backwards.

Abdomen with only nine definitely marked segments, the two last (9th and 10th) being completely fused together. First abdominal segment very short ventrally, but slightly longer than the metathorax dorsally. The succeeding segments rapidly lengthen and widen up to the 4th, which is about equal to the 5th, but differs from it in the narrowing of the dorsal portion, which is also more darkly coloured, as described above. From the 5th segment backwards, each segment becomes slightly narrower than the one preceding it, their lengths remaining about the same, the 5th segment being about $4\frac{1}{2}$ times as wide as long. The last segment is well rounded posteriorly, and carries the anal opening at its extremity. *Abdominal legs* of small size, finely shagreened and strongly pointed, though not definitely segmented: they are clearly to be seen in the half-grown larva, but in the full-fed larva are retracted and invisible when at rest, though they can just be seen when the larva is walking. *Spiracles* present on abdominal segments 1–8 inclusive, making, with the prothoracic spiracles, a total of nine pairs. Each spiracle is a small circular orifice surrounded by a broad supporting rim about thrice the diameter of the opening, which shows no signs of any sculpturing. The abdominal spiracles are placed slightly above and anterior to the lateral row of macrotrichia, and lie at the level of the lower edge of the dark colouring already described, but separated from it, in the case of segments 2–4, by a small circlet of cream colour.

Chaetotaxy:—Referring again to the shape of the larva in transverse section, which is hexagonal, it will be seen that, owing to the concavity of the dorsal and two latero-dorsal sides, there are four strongly-developed ridges running almost the whole length of the larva (Plate XXXIV, fig. *a*); two of these may be called *dorsal ridges*, the other two *lateral ridges*. Each segment from the metathorax to the 8th abdominal carries *four* large, specialised macrotrichia, one projecting from each of these ridges, as shown in Plate XXXIV. In addition to these four macrotrichia, the mesothorax possesses another pair, situated on two small pale areas between the dorsal and lateral ridges on each side, but closer to the former than to the latter. The prothorax carries no less than *six* pairs of these macrotrichia, four pairs being arranged around or very close to the anterior ridge and two pairs dorsally behind it. The head is devoid of macrotrichia, as would be expected owing to its retractile nature. The last abdominal segment, consisting of the fused 9th and 10th, carries four pairs of macrotrichia.

Each of the *macrotrichia* (Text-fig. 1, *f*) is set in a small but definite base, and is of the form which I have already named *dolichaster* (Greek

δολιχὸς, long, and ἀστὴρ, star) in connection with the chaetotaxy of the larva of *Psychopsis elegans* (Order Planipennia); that is to say, it is a slender elongated pyramid with its apex at the point of insertion, and ending distally in a smaller or larger number of slightly projecting angles, so as to resemble a small star when viewed end-on. The star-like appearance of the end view is, however, less noticeable in the present larva than in *Psychopsis*, partly owing to the angles being little prominent, and partly because the pyramids are mostly only four- or five-sided. Some of the macrotrichia, on the abdomen especially, are almost as thick basally as distally, and the terminal angles do not project more than as shown in Text-fig. 1, *f*. These macrotrichia are evidently closely related in form to those of the larva of *Micropteryx*, which have been called by Dr. Chapman *bullae*, and differ from them chiefly in not being inflated into more or less bladder-like bodies. Both are to be regarded as stages in the evolution of *scales*, the flattening of a dolichaster producing a narrow scale with longitudinal striae, and the flattening of a bulla producing a broader, oval scale, with similar but more numerous striae. It should also be noted that the larva of *Micropteryx* carries *eight* rows of bullae, whereas the larva of *Sabatinca* has only *four* rows of dolichasters.

There does not appear to be any clear connection between the chaetotaxal arrangement in the larvae of Micropterygidae and that found in other Lepidopterous larvae, inclusive of the Hepialidae. Bearing in mind the close comparison which can be made between the typical chaetotaxy of a Lepidopterous larva and that to be found in certain Planipennian and Mecopterous larvae, one would be justified in assuming that, in this character, as in the general shape and coloration of the larva, the Micropterygidae are highly specialised in correlation with their mode of life as dwellers in masses of moss or liverwort. The macrotrichia of the *Sabatinca* larva are closely similar to the processes or spines observable on the liverworts on which they feed, as Mr. Philpott observed when watching the living larva. Consequently it may be suggested that the right food-plant for the larvae of *Micropteryx* will be found to be a species of liverwort in which the processes more resemble the bullae of the larva (although I do not know whether such species of liverwort do actually occur in England).

As in the case of the macrotrichia, the *microtrichia* of the larva are highly specialised, being no longer visible as distinct microscopic hairs, but having become completely flattened down on to the cuticle, like some of the *micrasters* in *Psychopsis* larvae, and all more or less conjoined together, so as to produce a fine polygonal ridging of the cuticle. Towards the posterior margin of each segment, this

ridging is changed into a series of reniform marks of very minute size, arranged in a more definite order parallel to the margin of the segment.

On the first six abdominal segments, arranged close together on either side of the mid-dorsal line, there are to be seen a pair of small, hard ridges of a very dark colour, each ridge carrying four or five short blunt teeth (Text-fig. 1, *h*). These I propose to call the *dorsal combs.* They are arranged longitudinally, and each pair lies close to the posterior end of its segment. Thus they occupy much the same position as the paired annulated dorsal tubercles in the larvae of Mecoptera.

Description of the Pupa and Cocoon of Sabatinca incongruella *Walk.*

(Text-figs. 2—4)

Cocoon :—The *cocoon* of *Sabatinca incongruella* is of a broadly oval shape (Text-fig. 2), 3·0 mm. long, with a transverse diameter, across the middle, of 2·3 mm. The posterior end is very slightly pointed. In colour it is a medium brown. It is formed of rather coarse silk, and has a somewhat leathery appearance. It was found attached by its slightly pointed posterior end to the stem of a piece of liverwort, the cocoon itself projecting nearly at right angles, but slightly inclined downwards from the stem. The pupa had cut open the anterior end somewhat roughly, and the pupal skin was found projecting more than half-way out of the cocoon.

Pupa :—A careful examination of the macerated pupal skin shows that the pupa must be rather stout, not much elongated, with a general shape very closely resembling that of the Hemerobiidae and other small Lacewings.

The abdomen is broadly oval in shape, convex dorsally, with the last two segments somewhat bent under ventrally and the thorax also curved forward somewhat ventrally. The head is bent forward ventrally, so that the whole pupa has a strongly curved position within the cocoon.

Head (Text-fig. 3, *a*) fairly broad, with convex epicranium. *Antennae* with very large basal segment; second segment about three-fifths as long, narrower; remaining segments narrower still and very short, all closely similar; total number of segments thirty-seven. *Compound eyes* large, separated by a space somewhat wider than their diameter. Epicranium, frons and clypeus carrying a few very long, slender hairs; a set of three such hairs stands behind each eye.

Mouth-parts :—*Labrum* apparently with the outer margin entire, slightly convex. *Mandibles* of normal size, not hypertrophied as in *Eriocrania* and a number of Trichoptera; in shape somewhat triangular, with a broad base carrying the condyle at its outer angle and with a very strongly-formed apical tooth, sharply pointed. The inner edge of this tooth, from base almost to apex, is excessively finely crenulated. The two mandibles are not symmetrical, the

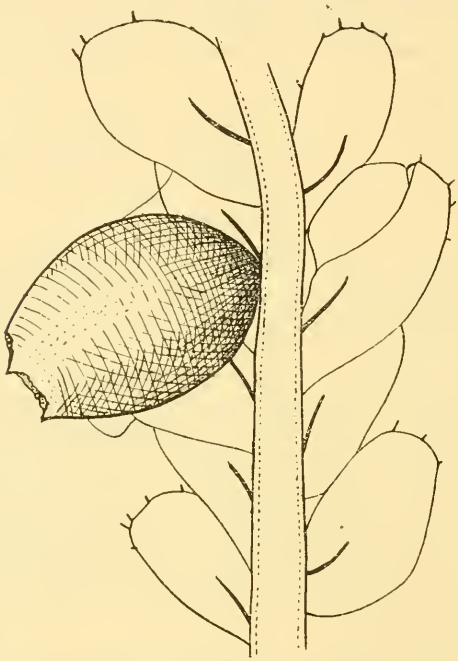


Fig. 2.—*Sabatinca incongruella* Walk. Cocoon, attached to stem of liverwort. (× 10·7.)

right one carrying, about half-way from base to apex on its inner margin, a much smaller tooth, between which and the large tooth a small notch is formed. Correlated with this formation, there is on the left mandible a slightly projecting, sharp, smooth edge, which evidently works in the notch of the right mandible. By this means, after the sharp teeth of the two mandibles have pierced the pupal skin, it may be supposed that a kind of scissor-like action is brought into play, so that the cocoon can be gradually cut or torn more or less transversely to its main axis. This type of

mandible is quite generally met with in pupae of the Orders Planipennia and Mecoptera. *Maxillae* with short, broad base, prominent palpus formed of five nearly equal segments, and short galea and

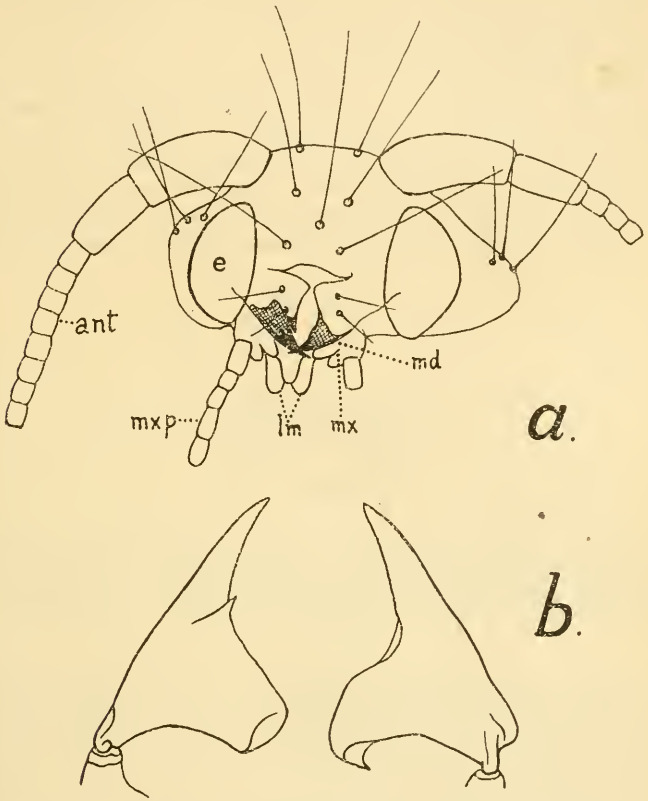


Fig. 3.—*Sabatinca incongruella* Walk. Pupal skin, macerated in 10 per cent. KOH. *a*. Head, showing *ant*, antenna, with most of the distal segments omitted, *e*, compound eye, *lm*, labium, *md*, mandible, *mx*, maxilla and *mxp*, maxillary palp. (× 40). *b*. Mandibles, viewed from inner or ventral side, showing condyle *in situ* in ginglymous joint. (× 87.)

lacinia. *Labium* with three short, rounded lobes, of which the middle one lies above the other two and probably represents the hypopharynx; the palpi are not visible in the macerated pupal skin, and have probably become detached and lost, as they would in any case be exceedingly small.

Thorax considerably broader than head; *wing-cases* folded down along the sides of the abdomen in the usual manner, but very long for the size of the pupa; their tips only appear to be slightly glued together. *Legs* folded down ventrally along the abdomen; the tibiae and tarsi of the hind legs, at any rate, if not of the other two pairs, somewhat glued together.

Abdomen slightly narrowed at base, broadly oval, well rounded posteriorly. Segments 1–2 very short, 3–8 considerably longer, each about four times as wide as long in the macerated specimen; 9–10 very short, ring-like, but quite distinct from one another (Text-fig. 4). Anal opening clearly visible on the soft terminal membrane beyond the chitinous ring of segment 10. In the narrow zone of soft membrane forming the suture between segments 9 and

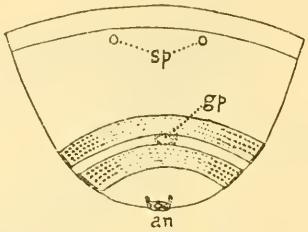


Fig. 4.—*Sabatinca incongruella* Walk. Pupal skin, macerated in 10 per cent. KOH. End of abdomen, showing segments 8–10, the two last appearing as narrow transverse bands (× 40): *an*, anus, *gp*, supposed indication of vestigial gonopore, *sp*, spiracles of segment 8.

10 there is a very slight appearance of a pale mid-ventral circular area with somewhat darkened circumference, which might indicate the position of a vestigial gonopore; but I cannot be certain of this. The imago which emerged from this pupal skin was a female. Therefore, if this appearance really represents the position of an original genital orifice, it would indicate that the present terminal position of the genital opening in the females of Micropterygidae is a secondary specialisation, and of no account whatever as a character to be used in an argument for forming a new Order for these insects. The eight pairs of spiracles on segments 1–8 are all clearly visible.

Phylogenetic Conclusions from a Study of the Larva and Pupa.

The form of the larva shows that the genus *Sabatinca* is closely related to *Micropteryx*, as a study of the imago also

shows. The two genera are therefore rightly placed together in the same family Micropterygidae (*s. str.*). Their larval type has nothing at all in common with that of the Eriocraniidae, whose larvae are leaf-miners, devoid of both thoracic and abdominal legs, and with an entirely different chaetotaxy. The larva of *Sabatinca* (and presumably also the full-grown larva of *Micropteryx* *) differs from all other Lepidopterous larvae in having the compound eyes still present in their normal form, instead of in the degenerate form found in other Lepidopterous caterpillars, where the separate eye-elements have become divided from one another and are often incorrectly termed ocelli. Yet other Lepidopterous larvae possess normally *six* of these eye-elements, whereas *Sabatinca* has only five, the ventral one being absent. This indicates that the Micropterygid larval type branched off along a line of its own, from the very base of the Order. We may assume that the original Lepidopterous larva possessed a compound eye with at least six facets, in its last instar, and that the Micropterygid type specialised by losing the most ventral facet and enlarging the most anterior one, without any separation of the six elements, whereas the remainder of the Lepidoptera kept the six elements intact, but gradually distintegrated the original compound eye into six tiny separate elements. In the same way, the highly specialised form of the larva of *Sabatinca*, its feeding habits, and its remarkable chaetotaxy all point to its representing an exceedingly early side-line of specialisation within the Order.

Quite different is probably the meaning of the small retractile head with its three-segmented antennae, and the presence of definite walking-legs of small size on all the abdominal segments. All these characters are to be found in the more primitive larval forms within the Order Mecoptera (*Chorista* and *Panorpa*), though it should be noted that the Mecopterous larvae keep the normal caterpillar form and have a chaetotaxy of normal macrotrichia arranged in a manner fairly closely corresponding to the typical Lepidopterous arrangement, but with certain small differences. In the Mecopterous larvae, also, the second segment of the antenna, instead of being long and slender, is large and dome-like, filled internally with an

* The compound eyes of *Micropteryx* larvae are not mentioned in Dr. Chapman's description (*l.c.*, pp. 342–4), but are indicated in their correct positions in his figures on Pl. VI).

enormous mass of nerve-cells forming a large Johnston's organ. Young Mecopterous larvae also have the abdominal walking-legs distinctly segmented, like thoracic legs, and the same appears to be true of the first instar of the larva of *Micropteryx*. As the larva grows older, the abdominal legs become smaller in comparison and lose their segmentation, the larva progressing more and more by means of the wave-like motion of the segments from before backwards, without any actual gripping of the surface by means of the legs. It would seem probable, therefore, that, in the normal Lepidopterous larva we have in the so-called "prolegs," with their circlets of hooks, a specialisation of the basal segment or coxa of the original abdominal walking-leg (or segmented endopodite), homologous with the thoracic leg, but already reduced in the larval forms of the first Pterygota.

While we see, therefore, a definite relationship indicated by the larval type of *Sabatinca* with that of the Order Mecoptera, we are unable to indicate any such relationship between this same larval type and that of the Trichoptera. The latter has a prominent head, long, cylindrical body, strongly formed thoracic legs, and no abdominal legs at all except the anal pair, which are specialised as gripping-claws or hooks. It is specialised for an aquatic existence, as is also the pupa, with its swimming-hairs and other specialised structures. We can only conclude that *Sabatinca* exhibits a larval type which is in most points much more archaic than that of the Trichoptera, and one which it would be impossible to derive from any larval type known within that Order.

Turning next to the pupa, we may note first of all the very general resemblance in the shape of the cocoon and the form of the pupa to those found in the more archaic types within the Order Planipennia; with this difference, that whereas the cocoon of the Planipennia is spun from the anus, it seems practically certain (though not actually observed) that the cocoon of *Sabatinca* is spun from the salivary glands, though without the aid of a true spinneret. This would account for its coarse, somewhat leathery texture; for the silk would be exuded rather as a stream of glue than as a fine thread. The general form of the pupa is that of the primitive *pupa libera* found throughout the Orders Mecoptera, Megaloptera and Planipennia, and also, with certain specialisations, in the Trichoptera. The

amount of fusion or soldering of external parts is very slight, being confined to the tips of the wings and the distal portions of the hind-legs, with possibly a slight fusion of the other legs, though these were free in the macerated specimen. This is about the amount of fusion noticeable in Mecopterous and Planipennian pupae. Judging from the macerated specimen, all the segments of the abdomen of the pupa are freely movable in *Sabatinca*, as in the case of the pupae of the other Orders just mentioned.

Much has been made by various authors of the remarkable mandibles found in the pupa of *Eriocrania*, and their resemblance to similar hypertrophied mandibles found in certain Trichopterous pupae. A wider knowledge of the more archaic types of pupae within the Holometabolous Orders would surely have convinced these authors that it is a very far-fetched argument to try to draw from this any grounds for assuming that the Lepidoptera are descended from the Trichoptera. It is only certain specialised pupal types within the Trichoptera which have the mandibles thus hypertrophied and crossed, and such a development is only a secondary one, correlated with some special difficulty in cutting a way out of a particularly tough cocoon. In the case of *Eriocrania*, the cocoon is placed underground, and is made of silk with particles of sandy soil closely interwoven. Pupal mandibles of the normal type would not open such a cocoon; and hence, undoubtedly, occurred the evolution of the hypertrophied form found in that genus. The pupa of *Sabatinca* lives in a softer cocoon, and exhibits a normal archaic type of mandible, very similar to the mandibles found in the pupae of Mecoptera, most Planipennia and a fair number of Trichoptera also. They help to prove its *relationship*, undoubtedly, to all of these Orders, but not its *descent* from any single one of them. In the same way, the complete form of the pupal maxilla, with its separate galea and lacinia, and five-segmented palp, does not help to prove *descent* from any one of these Orders, but only shows that this little Lepidopteron has kept the original archaic form of pupal mandible common to all Panorpoid Orders, and is closely related to all of them.

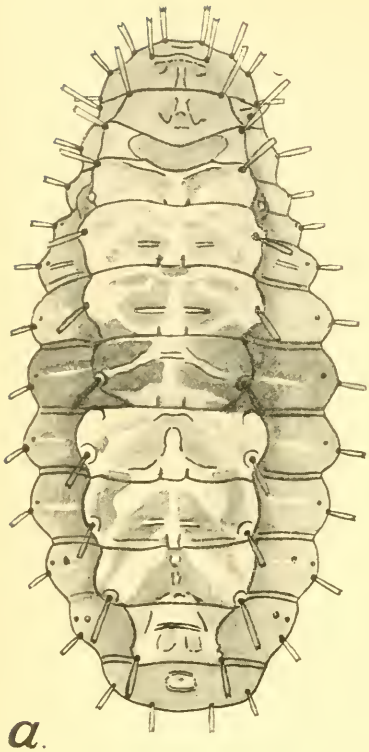
Taking the total evidence of the larva, cocoon and pupa, we may reasonably conclude that *Sabatinca* is, on the whole, more archaic in its early stages than any existing Panorpoid insects excepting only the Mecoptera. The larva shows on the whole a preponderance of Mecopterous characters, but

is more highly specialised than the typical Mecopterous larva in all points, except only in the form of the antennae. The Mecopterous larvae of the genera *Chorista* and *Panorpa* have a more generalised form, and chaetotaxy, a head which, while definitely retractile, is not so reduced or so regularly concealed as in *Sabatinca*, compound eyes with from forty to more than fifty facets, and much more general ground-feeding habits. Also these larvae do not form cocoons, but pupate free in the earth, or in a hardened earthen cell, the result being that the pupa is more normally elongate, and not so much curved round upon itself. The general characters of the pupa are, apart from this, almost entirely archaic, and indicate that it has persisted unchanged, except for inclusion within the cocoon, from the earliest times in which Holometabola existed.

The above conclusions agree well with what we know at the present time of the ancestry of the Lepidoptera from palaeontology. The fossil *Belmontia*, from the Upper Permian of Belmont, N.S.W., has been claimed by me to represent the ancestral type from which both Trichoptera and Lepidoptera were derived.* Recently a related fossil, *Parabelmontia*, has been discovered in the same beds, and differs chiefly from *Belmontia* in having the first cubitus of the wing simple instead of forked.† This new fossil, therefore, completes the record of the ancestry of the Diptera, through the Triassic Paratrichoptera backwards, until it merges into the same fossil Order Paramecoptera in which the common ancestor of the Trichoptera and Lepidoptera is to be found. In forming the new Order Paramecoptera for the fossil *Belmontia*, I pointed out how this type was closely similar to the older Mecopterous type of wing, but differed from it in important respects, which showed that it was not a direct offshoot of the Order Mecoptera as it existed in the Upper Permian, and as it still exists almost unchanged at the present day. Thus we now see that the common stem of the three closely related Orders Trichoptera, Lepidoptera and Diptera is to be found in the Upper Permian within the Order Paramecoptera, the Diptera lying closer to the Mecoptera than do the other two. If these conclusions be correct, we should not be surprised to meet with some existing archaic Lepidopteron which showed distinct Mecopterous affinities in its larva and

* Proc. Linn. Soc. N.S.W., 1919, xliv, pt. 2, pp. 231–256.

† *Ibid.*, 1922, xlvii, pt. 3, pp. 281–287, pl. xxxiii, f. 2, text f. 3.



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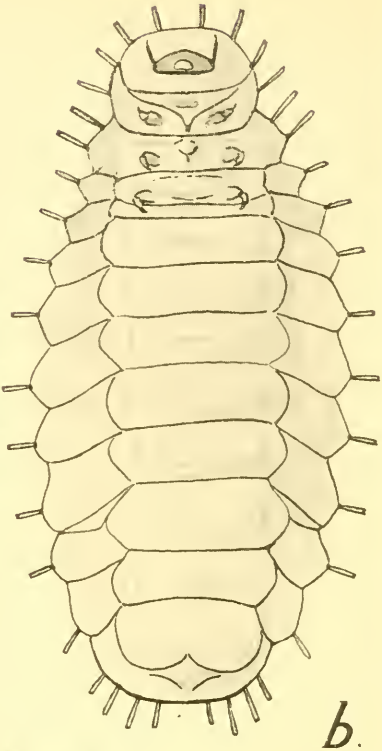

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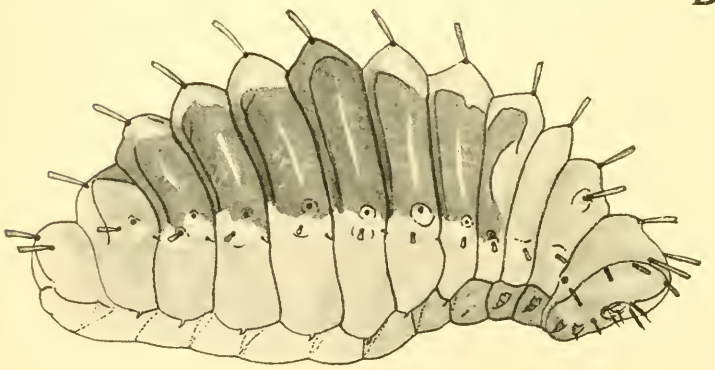

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LARVA OF SABATINCA BARBARICA

pupa. Such an archaic type is *Sabatinca*, a Lepidopteron whose life-history shows us that it may well have been evolved long before the Flowering Plants came on the scene, and has probably kept unchanged, through millions of years, its diet of lowly liverwort.

In concluding this paper, I desire to thank my wife for the execution of the wash drawings in Plate XXXIV; these were done with the help of my own camera lucida drawings of the larva. I also wish to thank Mr. Philpott for so kindly sending his material to study and describe. To him belongs the sole credit for the actual discovery of this wonderful little larval type, and he is greatly to be congratulated on the results of his long and patient searching for it.

Explanation of Plate XXXIV.

Last larval instar of *Sabatinca barbarica* Philp.

Fig. *a*.—Dorsal view (× 27).
b.—Ventral view (× 27).
c.—Lateral view (× 27).

XVII. *On the occurrence, near London, of the Flea* Ceratophyllus vagabundus *Boh. under unusual circumstances.* By James Waterston, B.D., D.Sc., F.Z.S., Assistant Keeper in the Department of Entomology, British Museum (Nat. Hist.).

(Published by permission of the Trustees of the British Museum.)

[Read June 7th, 1922.]

Plate XXXV.

Along with samples, which included both imagines and larvae, of the coleopteron *Xestobium rufovillosum* De Geer (= *tesselatum* Oliv.), found to be damaging trusses in the Great Hall, Hampton Court, several small rounded objects were recently forwarded to the Department of Entomology, British Museum.

These have been studied by Dr. C. J. Gahan, Messrs. M. A. C. Hinton, A. J. Willmott and myself, and our unanimous opinion is that they are hawthorn (*Crataegus* sp.) stones brought to the place of their discovery and there devoured by mice.

The cup-shaped appearance, to which attention is drawn by the sender, Sir Frank Baines, H.M. Office of Works, is due to the fact that one of the ends of the stone had usually been bitten off by the mouse in getting at the kernel. The truss, in fact, had been used as a winter storehouse, and, besides the stones, yielded two shells of the mollusc *Candidula caperata* Mntg. (det. G. C. Robson), which may also have been brought in by mice.

These hawthorn stones, brown and discoloured, especially on the outside, must be of considerable age, though it is impossible on the evidence available to say exactly how old they are. On none of them is there any trace either of the calyx of the flower or of the mealy pericarp. In some the micropyle is large and obvious, and all are probably a trifle smaller than samples of stones prepared by removing the pericarp mechanically. (In the latter case, too, the micropyle is small and inconspicuous, and it is only by excising some tissue that a passage to the seed cavity can be demonstrated.) In one or two examples

fragments of insect remains are fixed to the surface of the stone, and in one case two small fragments of flint (Fig. 1) are firmly embedded in the outer wall.

Something more than nibbling of the haw by a mouse must have been required to produce such conditions, and a probable cause is not far to seek. Field-mice are known to frequent the defecating places of thrushes, to feed on fruit-stones found there, and it is from such a source, I believe, that the present sample originally came.

The seed of the hawthorn is frequently destroyed by a Phytophagous Chalcid (*Syntomaspis druparum* Boh.), a species which also attacks apples, sometimes to a serious extent, and is, in fact, known to economic entomologists as

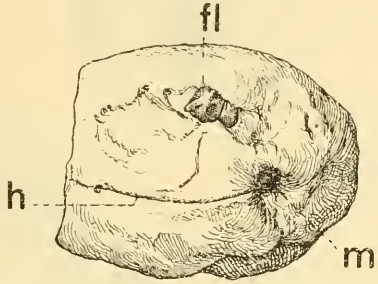

Fig. 1.—Hawthorn stone, showing end bitten off, and two fragments of flint, embedded in outer wall presumably in passing through the alimentary tract of a bird. *fl.* flint, *h.* hilum, *m.* micropyle.

"The Apple Seed Chalcis." The Chalcid has in this country been bred from hawthorn stones known to have passed through blackbirds, and hatching may take place even so late as the second spring from the falling of the fruit to the ground. The pupal envelopes of the *Syntomaspis* (especially of the ♀) are rather distinctive structures, and, though I had no expectation of discovering a living specimen, it seemed worth while to examine the interior of some of these stones on the chance that recognisable fragments either of the *Syntomaspis* or its pupa might be found.

Several of the stones were plainly empty, but one seemed to be a more promising subject for investigation. The stone selected for opening (Fig. 2) was apparently complete, but showed a large micropylar perforation (*m*).

On closer examination, however, it became apparent that the upper end had been shortly bitten off, the piece removed having been partially replaced by some extraneous matter. When this had been cleared away sharp teeth marks were plainly visible. It was also evident that the space within the seed walls was fully occupied.

A needle was inserted at the point *c* (upper figure) and pushed down towards the micropyle, keeping close to the

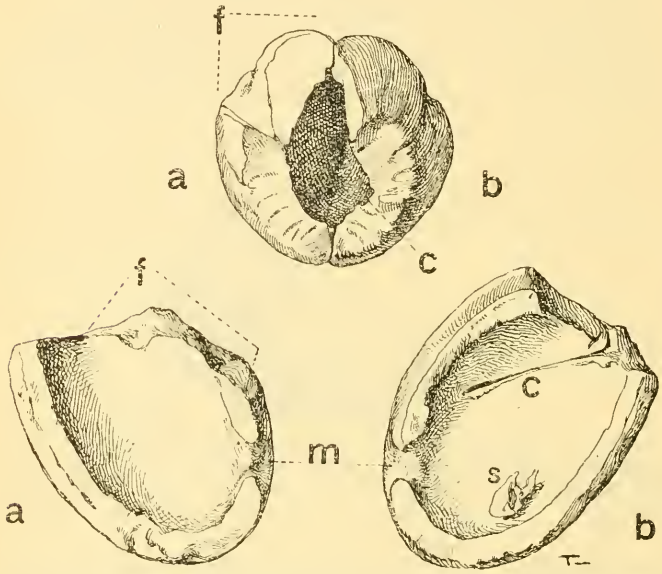

Fig. 2.—Hawthorn stone in which a ♂ of *Ceratophyllus vagabundus* Boh. occurred. The upper figure shows the upper end of the stone with marks of incisor teeth. *a*. left, *b*. right half, *m*. micropyle, *c*. needle cut, *f*. fractured surface. *s*, portion of larval skin.

inner wall of the right-hand side (*b*) of the stone. About two-thirds on the way to the micropyle, the needle point, released by the curvature of the surface traversed, impinged suddenly on the opposite side (*a*), from which a fragment (*f*) shot off and was lost. The stone at the same time fell apart in two halves, the left (*a*) being clean, while a large composite mass filled the right side (*b*).

The occlusion, where the needle had been inserted, was now seen to consist of a brown-papery layer.

The whole mass was next cut round with a sharpened needle point and successfully transferred to a 10 per cent. KOH-solution, only a small fragment (*s*) adhering to the inner stone wall. In potash considerable swelling took place, and the following points were noted.

(*a*) The bulk of the mass consisted of a fully formed flea, a ♂ *Ceratophyllus*.

(*b*) The paper-like plug at the cut end of the stone was evidently part of a cocoon wall.

(*c*) The incomplete remains of a cast-off skin, the rest (*s*) had adhered to the inner surface of (*b*) as noted above.

(*d*) A fragment of the seed and seed-coat persisted.

(*e*) The presence of numerous black hollow globules.

(*f*) The whole was woven together by a mass of fungus mycelium.

We are now in a position, I think, to reconstruct with some degree of probability the story of the vicissitudes of this hawthorn stone and its contents.

The haw was eaten in the autumn by one of our thrushes, probably a blackbird (*Turdus merula* L.), and the stone duly evacuated. Seized on by a mouse (*Mus* sp.) it was next carried to the little rodent's winter storehouse high up on the truss beneath the roof.

Some time later the seed was devoured, but, as the hole made in the stone by the preliminary biting of the mouse was somewhat smaller than usual, the seed contents were not completely removed.

Meanwhile, somewhere near the mouse store a passerine bird, perhaps a starling (*Sturnus vulgaris* L.) or a jackdaw (*Corvus monedula* L.), had either nested or roosted long enough to disseminate its fleas. One of these may have laid its eggs in the rubbish and dust of the mouse store, or it may have reached there as a larva seeking safe quarters for pupation. In any case, a flea larva ultimately squeezed its way into the empty stone, spun up and went through its transformations. On its emerging as an adult, the cocoon was ruptured on the side *towards* the micropyle and the flea ultimately died of starvation. It had previously evacuated its gut of the accumulated waste products of the pupal stage in the form of the characteristic black globules already referred to.

The last chapter of the story records the entrance of a fungus which destroyed all the soft parts of the dead insect, down even to the membranes between the sclerites.

These sclerites were still held in position in potash, but on transferring to glacial acetic acid complete disintegration ensued.

A point of minor interest may be referred to in passing. The flea on breaking from its cocoon must have been closely confined. Escape by the micropyle was impossible, and it is not certain that an exit could have been effected through the aperture made by the mouse's bite. Unfortunately, no measurements of this hole were made *before* breaking up the stone, and afterwards they would not have been reliable. In any case, the imago pierced the cocoon on the side remote from the larger aperture, and the cocoon wall there remained intact, possibly because the insect was unable to turn round, possibly from the failure of an instinctive reaction to repeat itself.

The disintegrated flea on being mounted presented all the characters of *Ceratophyllus vagabundus* Boh., a determination in which Dr. K. Jordan thoroughly concurs.

As this is one of the rarest of bird fleas I have thought it well to bring together the scattered notices of its occurrence. In the list of references I have mentioned mainly papers containing definite records. A few additional references will be found in Mr. Rothschild's "Synopsis of the British Siphonaptera," Ent. Mo. Mag., 3rd Series, Vol. I, pp. 96–97, London, March 1915.

Boheman does not state on what material his description was based. Later his types were discovered in the Riksmuseets, Stockholm, *without a name* (but otherwise with full date), by Wahlgren, who, misled by Taschenberg (1880) and in ignorance of Boheman's paper, in 1903 redescribed the species as *Ceratophyllus digitalis*. Wahlgren correctly recognised the affinity of *C. digitalis* with "*Pulex avium* Auctt." He also, almost immediately, realised his mistake in having redescribed Boheman's species, and published a corrective note. The only other synonym is *Ceratophyllus insularis* Roths. (1906). As will be seen, there are two records from Spitsbergen, one from Switzerland, two from England (Thames Valley), and six, more widely scattered, from Scotland. Some specimens from E. Turkestan (2 records q.v. list) are also, Dr. Jordan tells me, to be referred meanwhile to *C. vagabundus*. The species may have been overlooked elsewhere. We have no certain indication up to the present as to its normal host attachment or whether, indeed, it has any.

Locality.	How found.	Numbers.	Date.	Collector.	How recorded.	Recorder.
Spitsbergen, Cape Thordsen, im Eis-Fjord.	"Auf der Erde herumspringende."	♂, sev. ♀♀.	11.vii.1864.	Dr. Malmgren.	*Pulex vagabunda* Boh.	C. H. Boheman, 1866.
Spitsbergen.	"Neste von *Melanonyx brachyrhynchus*, Baill."	Both sexes.	1907.	Dr. O. le Roi.	*Ceratophyllus vagabundus* Boh.	Alfons Dampf, 1911.
Switzerland, above Findelen, Zermatt.	Nest of *Pyrrhocorax graculus*.	Many both sexes.	? 1918.	M. Biner.	,,	K. Jordan and N. C. Rothschild, 1920.
E. Turkestan Djarkent, Semiretschenskoi.	*Apodemus tscherga*.	4 ♂, 3 ♀.	Jan. 1913.	W. Rückbeil.	,,	N. C. Rothschild.
E. Turkestan, Narankol.	*Gallus domesticus*.	2 ♀.	July 1912.	,,	,,	,,
England, Berkshire, Reading.	"Hollow tree occupied successively by a woodpecker, an owl, and a starling."	♂.	? 1905.	Dr. N. H. Joy.	*Ceratophyllus insularis* Roths.	N. C. Rothschild, 1906.
England, Middlesex, Hampton Court.	In stone of hawthorn (*Crataegus*) from store of *Mus* sp.	♂.	iii.1922.	Sir Frank Baines.	*Ceratophyllus vagabundus* Boh.	J. Waterston.
Scotland, Midlothian, Colinton.	Nest of *Corvus monedula*.	Both sexes numerous ♂.	7.v.1906. 24.v.1906.	J. Waterston. ,,	*Ceratophyllus insularis* Roths.	,, 1906
Scotland, Midlothian, Gorebridge.	"Nest of *Muscicapa grisola*."	♀.	12.vii.1906.	,,	*Ceratophyllus vagabundus* Boh.	,, 1914
Scotland, Orkney Is., S. Ronaldshay, Burwick.	Nest of *Larus argentatus*.	4 ♂, 6 ♀.	9.vi.1906.	,,	*Ceratophyllus insularis* Rot hs.	,, 1906
Scotland, St. Kilda, Hirta (Main Island).	Nest of *Fulmarus glacialis*.	♂.	17.vi.1906.	,,	,,	,, 1906
Scotland, St. Kilda, Boreray Is.	"Coming down the rocks."	♀.	vii.1906.	Dr. C. Gordon Hewitt.	,,	,, 1906
Scotland, Forfarshire, nr. Kinneff, Todhead.	"Nest of *Larus argentatus*.	♀.	19.iv 1909.	J. Waterston.	,,	,, 1909

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Wahlgren, E. Uber *Pulex vagabunda* Bohem., in Entom. Tidskr., Bd. 24, p. 219. July 1903.

Rothschild, N. C. A new British Flea: *Ceratophyllus insularis* spec. nov., Ent. Mo. Mag., 2nd Series, Vol. XVII, p. 59, London, Feb. 1906.

Waterston, J. On some Scottish Siphonaptera, Ann. Scot. Nat. Hist., p. 212, Edinburgh, Oct. 1906.

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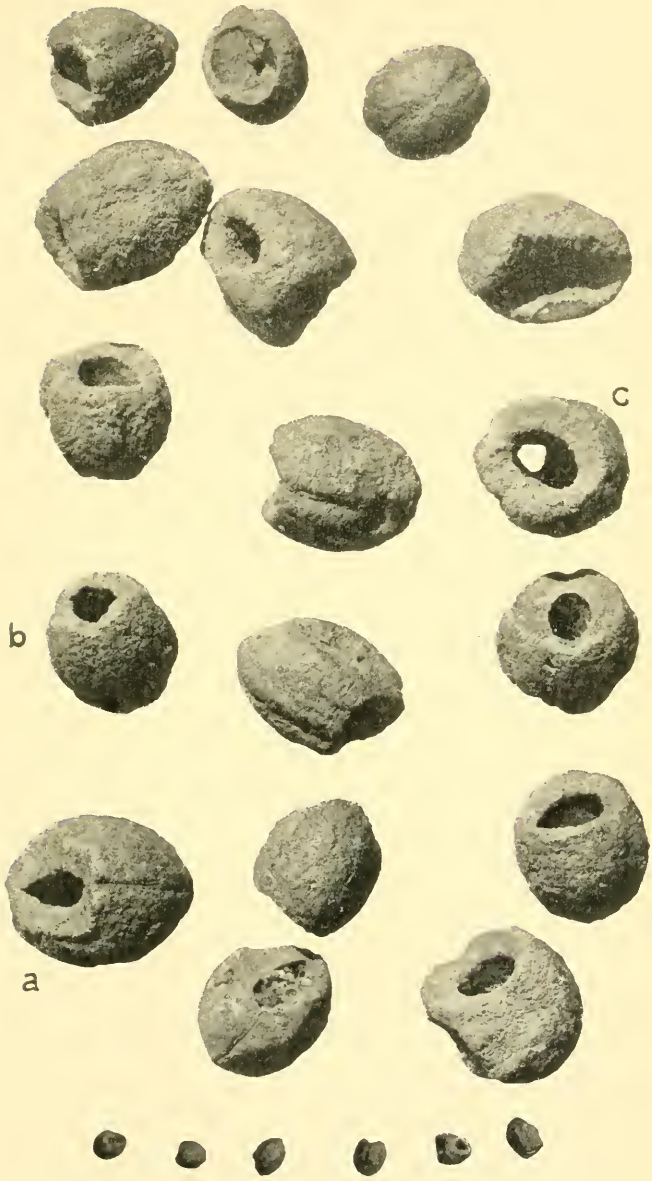
Jordan, K., and Rothschild, N. C. A Preliminary Catalogue of the Siphonaptera of Switzerland. Ectoparasites, Vol. I, p. 86, Jan. 1920.

Explanation of Plate.

Plate XXXV.—Hawthorn stones, magnified, from truss below roof of the Great Hall, Hampton Court. The six shown natural size (bottom row) are those of the mid-longitudinal row (except the top one) and the second from the top of the left row. Marks of teeth discernible on *a*, *b*, and *c*.



Vaus & Crampton *Fowler, imp.*

ERODED SEEDS FROM HAMPTON COURT

XVIII. *The* Rhopalocera *of the Mt. Everest* 1921 *Expedition.*

By N. D. Riley.

[Read October 18th, 1922.]

Plates XXXVI, XXXVII.

The following list is in some respects disappointing, a number of species, such as *Parnassius imperator augustus*, *Polygonia interposita agnicula*, etc., which one would expect to find, not being represented in the collection at all. On the other hand, the seven (possibly eight) new species and forms collected represent a very fair percentage on a total of only thirty-three (or possibly thirty-four) species obtained altogether by the Expedition. Nearly all the new forms are from the comparatively lower regions —such as Kharta, Nyenyam and the Rongshar Valley, the upper ends of deep gorges which cut through the Himalayas from Nepal. It would be difficult to explain the presence, within a few miles of Mt. Everest, of such species as *Catopsilia crocale* and *Colias fieldi* were it not for the existence of these valleys.

The highest altitude at which Rhopalocera were collected was at 18,500 ft., at the camp on the moraine shelf above the Rongbuk Glacier a short distance N.N.W. of Mt. Everest. Here *Parnassius acco* and *epaphus* and *Vanessa caschmirensis* and *ladakensis* were met with, but no other species. Above it Rhopalocera do not seem to exist anywhere in the Indo-Tibetan frontier region.

The specimens collected by Mr. A. F. R. Wollaston are indicated by (*W.*); these have become the property of the British Museum (Nat. Hist.). Those collected by Mr. Bullock and presented by him to the Hope Department, Oxford University Museum, are indicated by (*B.*). The third collection, made by Major Morshead, who was attached to the Expedition, is in the possession of Colonel Evans, who has very kindly sent me a list of it, which is appended.

My thanks are due to Prof. Poulton for allowing me to work out Mr. Bullock's collection, and for duplicates, and also to Mr. Wollaston for the following note on the localities. Further details on this last point can be found in the Journal of the Royal Geographical Society.

"Specimens taken before June 25th and all those labelled '*Tingri*' came from open stony plains at an altitude of between 13,000 and 15,000 ft. Weather bright and rainless. Vegetation very scanty. Dwarf plants only found.

"'*Rongbuk Glacier*' and '*East Rongbuk Glacier*.' On the north side of Everest; rounded stony mountains bare of snow up to about 19,000 ft. in July. Vegetation very sparse. Fog and snow in latter part of month.

"'*Thung La*.' Similar to Rongbuk.

"'*Nyenyam*,' '*Lapchi*' and '*Rongshar*.' Between 12,000 ft. and 13,000 ft., west of Mt. Everest. These places are in the upper parts of deep gorges which cut through the main range of the Himalaya, and are within a mile or two of the upper limit of subtropical vegetation of a Nepalese character.

"'*Kharta*' is similar to 'Nyenyam,' etc., and is situated about twenty-four miles due east of Mt. Everest. Vegetation partly Tibetan, partly subtropical, in character. Weather mostly wet in August and September."—A. F. R. Wollaston.

PAPILIONIDAE.

1. Papilio machaon sikkimensis Moore.

1903. *Papilio sikkimensis* Moore, Lep. Ind., vi, p. 44.
1907. *P. machaon* race *sikkimensis* Bing., Fauna Br. Ind. Butt., ii, p. 36.
1909. *P. machaon sikkimensis* Jordan, in Seitz Macro-Lep., ix, p. 47.
1912. *P. machaon sikkimensis* Evans, List Ind. Butt., Journ. Bombay N. H. Soc., xxi, p. 971.

Tibet Road, between Gautsa and Phari, 13,500 ft., 29/5/21 (*Bullock*).

1 ♂, 1 ♀, both very battered.

2. Parnassius acco gemmifer Frühst.

1901. *Tadumia acco* Moore, *l.c.*, v, p. 116. (part).
1907. *Parnassius acco* Bing., *l.c.*, ii, p. 129. (part).
1909. *P. acco gemmifer* Frühst., in Seitz, ix, p. 110.
1912. *P.* (*Tadumia*) *acco gemmifer* Evans, *l.c.*, p. 974.

1 ♂, above Rongbuk Glacier, 17,400 ft., 6/7/21 (*Bullock*).
2 ♂, 6 ♀, Thung La, 16,000 ft., 14/7/21 (*Wollaston*).
4 ♂, 2 ♀, Thung La, 14,000 ft., 15/7/21 (*Wollaston*).

3. Parnassius epaphus Oberthür.

1909. *Parnassius epaphus* Bing., *l.c.*, p. 120.
1912. *Parnassius epaphus* Evans, *l.c.*, p. 974.

(a) *P. epaphus everesti*, ssp. nov.

(Pl. XXXVI, fig. 7 ♂, fig. 8 ♀).

1 ♂, 30/6/21; 3 ♂, 1 ♀, 2/7/21; 2 ♂, 6/7/21; 2 ♂, 1 ♀, 7/7/21, 17,400 ft.; 3 ♂, 5 ♀, 14/7/21; 1 ♂, 2 ♀, 18/7/21, 18,500 ft. All "at camp N.N.W. of Mt. Everest on moraine shelf above Rongbuk Glacier" (*Bullock*).

A small but very well-defined local race. About the same size as *sikkimensis* Elwes and *phariensis* Avinoff, but differing from both of these, more particularly from the latter, in the greater opacity of the white ground-colour and the marked reduction of the black marginal markings of both wings. In the ♂ the submarginal lunules on the hind-wing are almost absent and in the ♀ only very slight, and the same applies to the submarginal series of the fore-wing, but to a lesser extent. The red markings are large and conspicuous on both surfaces, much as in *phariensis*. The race shows a very distinct approach to the more northerly forms *altynensis* Staud. and *nanchanica* Aust.

(b) *Parnassius epaphus himalayanus*, ssp. nov.

(Pl. XXXVI, fig. 6 ♂).

2 ♂, 17,000 ft., 8/8/21; 1 ♂, 16,700 ft., 6/8/21, Camp 9 miles E. of Everest, (*B.*).

1 ♂, Chog La, between Kharta Valley and Karna Valley, 8/8/21 (*W.*).

1 ♀, Rongshar Valley, 14,000 ft., 28/7/21 (*W.*).

♂. Approaches *sikkimensis* in general appearance very much more than does the preceding form, being more transparent and greyer. The submarginal band on the fore-wing is the most characteristic feature, the black lunules of which it is composed being so much increased in size as to form a continuous only slightly dentate band equal in width to the marginal band. The corresponding band on the hind-wing is similarly very conspicuous, and formed of very well-defined large wedge-shaped black marks. The fore-wing is devoid of red markings; the hind-wing has only the costal and discal spots red-centred.

In the ♀ the ground-colour is rather more opaque, but there is no black suffusion. The upper costal spot on fore-wing is red-centred, and, on the hind-wing, the basal spot as well.

The range of this subspecies is most probably east and west along the Himalayas; that of the preceding subspecies northward through Tibet.

4. **Parnassius hardwickii** Gray.

1901. *Parnassius hardwicki* Moore, *l.c.*, v, p. 111.
1907. *Parnassius hardwickei* Bing., *l.c.*, ii, p. 121.
1909. *P. hardwicki* Frühst., in Seitz, ix, p. 111.
1912. *P. hardwickii* Evans, *l.c.*, p. 974.
1 ♂, Nyenyam, W. of Everest, 12,500 ft., 17/7/21 (*W.*).
1 ♀, Rongshar Valley, W. of Everest, 14,000 ft., 28/7/21. (*W.*).
Both in excellent condition.

5. **Parnassius delphius lampidius** Frühst.

1903. *Parnassius delphius lampidius* Frühst., Iris, p. 44.
1907. *Parnassius delphius* race *whitei* Bing., *l.c.*, ii, p. 125.
1912. *Parnassius lampidius* Frühst., in Seitz, ix, p. 110.
1 ♂, Thung La, 14,000 ft., 15/7/21 (*W.*).

PIERIDAE.

6. **Pieris brassicae nepalensis** Doubl.

1904. *Danaus brassicae* Moore, *l.c.*, vi, p. 127.
1907. *Pieris brassicae* Bing., *l.c.*, ii, p. 170.
1910. *P. brassicae nepalensis* Frühst., in Seitz, ix, p. 139.
1912. *P. brassicae* Evans, *l.c.*, p. 976.
1 ♂, Kharta, 12,000 ft., 2/9/21 (*W.*).

7. **Pieris chumbiensis** de N.

1904. *Parapieris chumbiensis* Moore, *l.c.*, vi, p. 143.
1907. *Pieris chumbiensis* Bing., *l.c.*, ii, p. 174.
1910. *Parapieris chumbiensis* Frühst., in Seitz, ix, p. 140.
1912. *Pieris* (*Parapieris*) *chumbiensis* Evans, *l.c.*, p. 976.
1 ♂, between Gautsa and Phari, 13,500 ft., 29/5/21 (*B.*).

8. **Baltia butleri sikkima** Frühst.

1910. *Baltia sikkima* Frühst., in Seitz, ix, p. 138.
1912. *Baltia butleri sikkima* Evans, *l.c.*, p. 975.

1 ♂, 10 miles E. of Tatzang, 17,000 ft., 4/6/21 (*B.*).
Only very doubtfully separable from *B. butleri butleri* from Ladak and Cashmere.

9. **Colias cocandica tibetana,** ssp. nov.

(Pl. XXXVI, fig. 9.)

1915. *Colias cocandica* Evans, J. Bombay N. H. Soc., xxiii, p. 534.
2 ♂, Nyenyam, 13,000 ft., 19/7/21 (*W.*).

♂. *Upperside, fore-wing :* pale grey with only a very slight greenish suffusion. The light internervular spots in the broad marginal black band produced as fine rays which reach the margin. Hind-wing darker grey and rather greener, internervular pale spots not so well defined, a large pale area at cell end. Cilia white. *Underside :* the *hind-wing* and the apical area of *fore-wing* a beautiful deep green, the submarginal spots of both wings rather ill-defined, rust-coloured except in 1*b* and 2 of fore-wing where they are black. Discocellular spot on fore-wing small, white centred; on hind-wing larger, pure white, nearly surrounded by a rusty area which is produced towards margin in area 4.

This race is a great deal more like typical *cocandica* than is the Ladak representative (*C. thrasibulus* Früh.), but readily separable by its very grey appearance, which contrasts strongly with the markedly green upperside of *cocandica*. It is an approach to *nebulosa* Ob. from W. China, and probably is the same race of *cocandica* as that referred to and figured by Evans (*l.c.*) from the Tsang-Po, E. Tibet, at an altitude of 14,000 ft., collected by Capt. Bailey.

10. **Colias fieldi edusina** Felder.

1907. *Colias croceus* race *fieldi* Bing., *lc.*, ii, p. 243. (part).
1909. *Eurymus fieldi* Swinhoe, in Moore, *l.c.*, vii, p. 171.
1910. *Colias fieldi edusina* Frühst., in Seitz, ix, p. 165.
1912. *Colias fieldii edusina* Evans, *l.c.*, p. 979.

2 ♂, 2 ♀, between Kharta and Chung Pu, 13,000 ft., 28/7/21; 2 ♀, 30/7/21; 1 ♂, 1 ♀, 31/7/21, Kharta, 12,000 ft. (*B.*).
1 ♀, 7/8/21; 1 ♂, 14/8/21; 5 ♂, 19/8/21; 5 ♂, 20/8/21; 2 ♂, 21/8/21, Kharta, 12,000 ft.; 3 ♂, 17/7/21, Nyenyam, 12,500 ft.; 1 ♂, 28/7/21, Rongshar Valley, 14,000 ft. (*W.*).

A very constant series except as to size; 14,000 ft. seems to be about the highest point this species reaches in any part of its distribution.

11. Colias berylla Fawcett.

1907. *Colias ladakensis* race *berylla* Bing., *l.c.*, ii, p. 236.
1909. *Eurymus berylla* Swinhoe, *l.c.*, vii, p. 169.
1910. *Colias berylla* Frühst., *l.c.*, ix, p. 165.
1912. *Colias ladakensis berylla* Evans, *l.c.*, p. 979.

2 ♂, 26/6/21; 1 ♂, 7/7/21, Tingri, 14,000 ft. (*W.*).
All three absolutely typical.

12. Colias dubia Elwes.

(Pl. XXXVII, figs. 1–5.)

1907. *Colias dubia* Bing., *l.c.*, p. 239.
1909. *Eurymus dubia* Swinhoe, *l.c.*, vii. p. 167.
1910. *Colias dubia* Frühst., *l.c.*, ix, p. 165.
1912. *Colias dubia* Evans, *l.c.*, p. 979.

1 ♀, N.E. of Mt. Everest, E. of Deva La, 27/7/21, 16,000 ft.

Upperside, fore-wing: clear orange, paler below costa, apex and margin broadly black, the enclosed light markings paler orange, not at all uniform as to size, *i. e.* that in area 2 by far the largest, those in areas 1*a*, 4 and 5 equal and about half the size, the remainder very narrow; *hind-wing*, similar in ground-colour, largely suffused with blackish especially towards costa, but by no means entirely black; marginal markings in areas 5, 4 and 3 large and conspicuous, the remainder indistinct, merged into the smoky orange of the disc of the wing; discocellular spot bright orange, large. *Underside:* costa, apex, and outer margin of fore-wing and whole of hind-wing bluish green, not yellowish, central and basal areas of fore-wing as above, discocellular spot of hind-wing small, white, situated on the inner edge of a small diffuse purple patch, submarginal series very indistinct, brownish grey except in areas 1*a*-3 of fore-wing in which they are very conspicuous and black.

This female agrees much better in all respects with the ♂ type of *C. dubia* Elwes (P.Z.S., p. 481, 1906) than does the ♀ which Elwes then associated with his ♂, and can safely be assumed to be the true ♀ of that species. With it, as *C. dubia*, should be associated the *Colias* figured by

Fawcett (P.Z.S., 1904 (2), Pl. 9, fig. 10*a*, ♀) as *Colias eogene* var. *leechi* Gr.-Gr., ♀.

The female described by Elwes—which is in the B.M.—as his ♀ type of *dubia* is really a ♀ of *C. miranda* Frühst., and it agrees with the types of that form which are also in the B.M. For the sake of comparison the actual type specimens of *C. dubia* and *C. miranda* are here figured.

What is really the status of each of these forms it is difficult to say. The most likely hypothesis seems to be that *C. miranda* is the Himalayan, *C. dubia* the more truly Tibetan representative of *C. eogene*, to the Ladak form of which (*stoliczkana*) they show most resemblance.

13. Catopsilia crocale Cramer.

1907. *C. crocale* Bing., *l.c.*, p. 219.
1909. *C. crocale* Swinhoe, *l.c.*, vii, p. 88.
1910. *C. crocale* Frühst., *l.c.*, ix, p. 162.
1912. *C. crocale* Evans, *l.c.*, p. 979.

1♀, Lapchi, 12,500 ft., 22/7/21 (*W.*).

Rarely seen above 12,000 ft., on the southern slopes of the Himalayas only. (Lapchi is just at the upper limit of subtropical Nepalese vegetation.—A.F.R.W.)

NYMPHALIDAE.

14. Argynnis lathonia issaea Moore.

1900. *Rathora issaea* Moore, *l.c.*, iv, p. 241.
1905. *A. lathonia* race *issaea* Bing., *l.c.*, i, p. 441.
1912. *A. lathonia issaea* Frühst., *l.c.*, ix, p. 514.
1912. *A.* (*Rathora*) *lathonia issaea* Evans, *l.c.*, p. 582.

1 ♂, Nyenyam, 12,500 ft., 17/7/21 (*W.*).

15. Argynnis pales eupales Frühst.

1905. *Argynnis pales* Bing, *l.c.*, i., p. 447. (part).
1912. *Boloria pales eupales* Frühst., *l.c.*, ix, p. 512.

1♂, Nyenyam, 13,000 ft., 19/7/21 (*W.*).

16. Argynnis eugenia rhea Gr.-Gr.

1908. *A. eugenia rhea* Seitz, i, (Pal.), p. 233.

2 ♂, 1 ♀, E. of Doya La, 16,000 ft., 27/7/21 (*B.*).

1 ♀, Doya La, 16,700 ft., 1/8/21; 1 ♂, Rebu, 14,000 ft., 1/8/21; 2 ♂, 1 ♀, Kharta, 14,500 ft., 5/8/21 (*W.*).

1 ♀, Valley bottom 10 miles E. of Everest, 14,000 ft., 9/8/21 (*B.*).

Specimens taken at 16,000 ft. and above are much the smallest.

17. **Argynnis clara manis** Frühst.

1900. *Boloria clara* Moore (part), *l.c.*, iv, p. 253.
1905. *A. clara* race *manis* Bing., *l.c.*, i, p. 443.
1912. *A. clara manis* Frühst., *l.c.*, ix, p. 514.
1912. *A.* (*Boloria*) *clara manis* Evans, *l.c.*, p. 582.

1 ♂, E. of Doya La, 16,000 ft., 27/7/21, (*B.*).

18. **Melitaea sindura tibetana** Fawcett.

1905. *M. sindura* race *sikkimensis* f. *tibetana* Bing., *l.c.*, i, p. 453.
1912. *M. sindura tibetana* Frühst., *l.c.*, ix, p. 511.

1 ♂, E. of Doya La, 16,000 ft., 27/7/21 (*B.*).

19. **Vanessa chinensis** Leech.

1908. *V. urticae chinensis* Stichel, in Seitz, i, p. 203.

1 ♀, Tibet Plateau, between Kishong and Shigar Jong, 14,000 ft., 16/6/21 (*B.*).

20. **Vanessa caschmirensis aësis** Frühst.

1899. *Aglais kaschmirensis* Moore, *l.c.*, iv, p. 87.
1905. *Vanessa caschmirensis* Bing., *l.c.*, i, p. 367.
1912. *V. caschmirensis aësis* Frühst., *l.c.*, ix, p. 527.
1912. *Vanessa* (*Aglais*) *cashmirensis* Evans, *l.c.*, p. 579.

1 ♀, 30/6/21, 17,400 ft.; 1 ♂, 16/7/21, 18,000 ft., N.N.W. of Everest, above Rongbuk Glacier; 2 ♂, Kharta, 12,000 ft., 30/7/21 (*B.*).

21. **Vanessa ladakensis** Moore.

1899. *Aglais ladakensis* Moore, *l.c.*, iv, p. 90.
1905. *Vanessa ladakensis* Bing., *l.c.*, i, p. 368.
1912. *V. urticae ladakensis* Frühst., *l.c.*, ix, p. 527.
1912. *V.* (*Aglais*) *ladakensis* Evans, *l.c.*, p. 579.

1 ♂, 25 miles N. of Phari, 14,800 ft., 1/6/21; 3 ♂, 7 ♀, 15 miles E. of Tatzang, 15,700 ft., 3/6/21; 1 ♂, above Rongbuk Glacier, 17,400 ft., 30/6/21 (*B.*).

With regard to the last three species, these records are additional proof that the three are not all forms of *V. urticae*. *Ladakensis* and *caschmirensis* occur throughout the area traversed by the expedition, and dated speci-

mens, including some from other sources in the B.M., show them to be on the wing in that area throughout June and July. *Chinensis* seems only to have been taken in June, the above locality being the most western so far recorded. It was also taken at Gyangtse by the Tibet Exp. (1903), so its range well overlaps that of the other two.

SATYRIDAE.

Argestina, gen. nov.

Closely related to *Erebia* and *Callerebia*, having some of the characters of both. In appearance resembling more the former than the latter.

Antennae $\frac{2}{3}$ the length of costa, delicate, the club very broad and spatulate, short, arising rather abruptly. Palpi large, very hairy, as usual in this group. Tibiae and tarsal joints all spiny, but not conspicuously, the last tibial spine the most prominent on each leg. *Wings*, in shape, resembling more *Erebia*. Fore-wing costa arched, but not nearly so much as in *Callerebia*, hind margin conspicuously straight in ♂, more rounded in ♀. Subcostal vein very much swollen at base, median hardly at all. Vein 5, at origin, about equidistant from 4 and 6; 10 invariably arising out of stalk of 7, 8, and 9 well beyond cell end. Of the discocellular veins, the lowest is straight, the middle one very much bowed in, the upper extremely short. Hind-wing very little broader than fore-wing, the anal angle slightly produced towards median line, not extending far beyond extremity of abdomen, the outer margin evenly rounded. In the ♂ the central third of the fore-wing, except anteriorly, is occupied, in all except one species, by an area of very dark brown modified scales, transversely crossed by a number of fine ridges producing the appearance of ripples—a feature also present in some species of *Callerebia*.*

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* The following short key seems to separate the Himalayan species of this *Erebia*-like group into fairly natural genera :—

1 (2). Fore-wing MDC straight, considerably less than $\frac{1}{2}$ as long as LDC. . . . . *Erebia.*
2 (1). MDC strongly incurved, as long (or nearly so) as LDC.
3 (6). Club of antennae short, stout, arising abruptly.
4 (5). Vein 10 free or connate with stalk of 7, 8, and 9 . *Paralasa.*
5 (4). Vein 10 out of 7, 8, and 9 well beyond cell end . *Argestina.*
6 (3). Club of antenna long, narrow and arising gradually . . . . . *Callerebia.*

The generic names *Dallacha* and *Hemadara*, proposed by Moore for his species *hyagriva* and *narasingha* respectively, scarcely seem

Type: *Argestina waltoni* Elwes. (*Callerebia waltoni* Elwes, P.Z.S., p. 482, Pl. 36, f. 14 (♂), f. 15 (♀), 1906.

22. **Argestina karta,** sp. nov.

(Pl. XXXVI, fig. 11 ♂, fig. 12 ♀.)

1 ♂, 2 ♀, 30/7/21; 1 ♂, 31/7/21, Kharta, 12,000 ft. (*B.*).

♂. *Upperside, both wings:* very dark brown, almost black, the cilia paler, greyish. *Fore-wing* with the marginal area slightly lighter, a minute white-pupilled ocellus in area 5 and a very indistinct submarginal dark line from costa to about vein 3, the ripples on the area of modified scales very inconspicuous. *Underside, fore-wing:* warm chestnut brown, with a darker transverse shade just beyond the cell, the costa, apex, hind margin and tornus darker, grey brown, the apex, as far as ocellus, irrorated with dark ochreous; the ocellus black, reaching from vein 4 almost to vein 7, white pupilled, ringed with pale yellowish. *Hind-wing:* dark greyish, crossed by a basal, a discal and a submarginal very wavy darker line, and with a postdiscal series of 5 white points, the area from base to discal transverse line darker than the discal area, the whole wing densely sprinkled with very dark brown, and with ochreous, the latter more particularly just beyond discal transverse line.

♀. *Upperside, both wings:* much lighter brown than in the ♂. *Fore-wings:* the greater part of the wing, except the margins (more particularly inner margin), suffused warm chestnut brown, which renders the rather larger ocellus and the submarginal line very much more conspicuous. *Underside:* as in the ♂, except that the whole tone of the markings is rather lighter.

Length of fore-wing, ♂ 23 mm.; ♀ 22 mm.

Besides the type species (*waltoni* Elwes) and the species described above, the genus includes *inconstans* South, with its subspecies *gyala* Evans, and a fourth species obtained with *waltoni* by the Tibet Expedition in 1904.*

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to be justifiable. Although very aberrant in *facies* these do not seem structurally separable from *Callerebia*.

* *Argestina nitida*, sp. nov. See Appendix II.

23. **Paroeneis grandis,** sp. nov.

(Pl. XXXVI, fig. 10.)

2 ♂, Kharta, W. of Mt. Everest, 12,000 ft., 30/7/21 (*B.*).

♂. *Upperside, both wings :* rich bright fulvous, the hind margin (broadly), and the veins black; cilia light ochreous, broadly flecked with black at the extremities of the veins. *Fore-wing*: costal area suffused blackish, a black spot in area 5 centrally in the centre of a paler ochreous field, which is continued in a paler band interrupted at the veins, to inner margin. *Hind-wing :* a narrow transverse paler band crosses wing just within the black marginal border, the dark spots on cilia much smaller than on fore-wing. *Underside : fore-wing* pale ochreous, the broad discal band paler, not interrupted at the veins in one specimen, costal, apical, and hind marginal areas grey with numerous short darker striations (the type), interrupted at 2, 3, and 4 in the others. On the *hind-wing* the outer edge of the black basal area is extremely sinuous throughout its length and bordered by a narrow pale band (1–1·5 mm.). Beyond this, the whole wing surface heavily mottled with black, dark grey, and brown, through which and midway between hind margin and the pale transverse band, runs a very sinuous, interrupted broad black discal line; veins blue grey.

Length of fore-wing, 26–27 mm.

Nearest *P. bicolor*, but readily separated from all other members of the genus by the richness and uniformity of the fulvous coloration of upperside, the blackness of the margins, its size, and the width of the pale band of the underside of the hind-wing, which approaches that of, but remains narrower than in *P. bicolor* Staud.

24. **Paroeneis bicolor** Staud.

1911. *Oeneis pumilus bicolor* Frühst., *l.c.*, ix, p. 311.
1912. *Satyrus* (*Paraeneis*) *pumilus bicolor* Evans, *l.c.*, p. 562.

1 ♀, Nyenyam, 13,000 ft., 19/7/21; 1 ♂, 27/7/21; 1 ♂, 2/8/21, Rongshar Valley, 14,000 ft. (*W.*).

25. **Paroeneis sikkimensis** Staud.

1893. *Paroeneis sikkimensis* Moore, *l.c.*, ii, p. 38.
1905. *Oeneis pumilus* race *sikkimensis* Bing., *l.c.*, i. p. 129.

1911. *Oeneis palearcticus sikkimensis* Frühst., *l.c.*, ix, p. 311.
1912. *Satyrus* (*Paraeneis*) *palearcticus sikkimensis* Evans, *l.c.*, p. 562.

3 ♂, 2♀, 3/8/21, 17,000 ft.; 3 ♂, 5/8/21, 16,000 ft., S. of Kharta (*W.*).

3 ♂, 5 ♀, 6/8/21; 4 ♂, 1 ♀, 8/8/21, 5 miles E. of Everest, 16,700 ft. (*B.*).

Darker and very much smaller than either of the preceding species.

The specific limits in this genus are rather difficult of definition. The three species mentioned above show an interesting transition in size and coloration as the elevation increases. At Kharta, 12,000 ft., the largest and most richly coloured species in the genus is found (*P. grandis*); in the same region, but at 13,000–14,000 ft., a smaller form scarcely separable from *P. bicolor*, but yet rather larger and more darkly marked than that species, is to be found, considerably smaller than *P. grandis*, but with the same rich fulvous ground-colour, much more suffused with blackish. Higher still, at 16,000–17,000 ft., *P. sikkimensis* is met with; a still smaller insect, having barely two-thirds the wing span of *P. grandis* and much greyer above and below.

The genitalia show corresponding differences. In all the forms examined, the extremity of the clasper in the ♂ consists of a pair of lobes, an upper and a lower, and the tegumen, just below the uncus, bears a pair of large chitinous processes sometimes almost as long as the uncus itself. In *P. grandis* the upper lobe of the clasper is large, blunt and slightly longer than the smaller and much more pointed lower lobe. In *P. bicolor* and *P. sikkimensis*, however, the lower pointed lobe is by far the larger, and the upper blunt lobe, though retaining the outline of that of *P. grandis*, is very much shrunken in size, more particularly in *sikkimensis*, which thus approaches *P. pumilus* (from N.W. Himalayas), in which the upper lobe has entirely disappeared, the upper angle of the extremity of the clasp being merely bluntly rectangular.

P. grandis seems sufficiently distinct to be given specific rank, and the same may be said of *P. pumilus*. The form described by Staudinger as *P. pumilus* f. *bicolor*, however, has much more in common with *sikkimensis* than with *pumilus*, so much so, in fact, that it is extremely difficult, in a long series, to separate them off.

LYCAENIDAE.

26. **Polyommatus arene** Fawcett.

1909. *Lycaena stoliczkana arena* Seitz, i, p. 311.
1910. *Polyommatus ariana* (part) Swinhoe, *l.c.*, viii, p. 26.

1 ♂, between Kishong and Shekar Jong, 14,000 ft., 16/6/21; 2 ♂, 1 ♀, Shekar Jong 14,000 ft., 17/6/21 (*B.*).
17♂, 7 ♀, Tingri, 14,000 ft., 26/6/21; 1 ♂, 1 ♀, Nyenyam, 12,500 ft., 17/7/21 (*W.*).

Fresh and very worn specimens were taken together on 17/6/21; fresh specimens again on 17/7/21, whilst all the series from Tingri were taken in beautifully fresh condition. This seems to contradict rather flatly the statement in Lep. Ind., 8, p. 27, that *arene* is the dry-season form of *ariana*, as all the specimens are referable to *arene* and show very little variation indeed. None of the females exhibit more than a trace of blue suffusion on the upperside. The large white wedge-shaped mark arising from the orange lunules of the underside of the hind-wing in areas 3 and 4, and directed basad, as well as the pale ground-colour, separate this species at once from the next.

27. **Polyommatus everesti,** sp. nov.

(Pl. XXXVI, fig. 1 ♂, 2, and 3 ♀.)

1 ♂, 1 ♀, 27/7/21; 1 ♂, 28/7/21, Rongshar, 13,000 ft.; 2 ♂, 1 ♀, Rebu, 14,000 ft., 31/7/21; 5 ♂, 1 ♀, Kharta, 12,000 ft., 7/8/21; 2 ♂, 1 ♀, 19/8/21; 1 ♂, 2 ♀, 20/8/21; 1 ♀, 21/8/21, Kharta, 12,500 ft. (*W.*).
14 ♂, 3 ♀, between Kharta and Chung Lung Pu, 13,000 ft., 28/7/21; 2 ♂, 1 ♀, 30/7/21; 3 ♂, 2 ♀, 31/7/21, Kharta, 12,000 ft. (*B.*).

♂. *Upperside, both wings:* brilliant azure blue, the margins narrowly black, inwardly crenulate, cilia long, silvery-white, darker proximally. *Underside, fore-wing:* ground-colour sooty grey, slightly green tinged at the base, the ocelli black with very broad and well-defined white rings, viz. one in cell, just before origin of vein 3, and a discal series of six, the first and the last the smallest; a dark oval broadly white-ringed mark at cell end, the outer white edging produced to form a white cone or Y-shaped mark; a submarginal series of subcrescentic pale grey marks, followed by a

marginal diffuse white line, interrupted by the rather prominent veins; and a dark anteciliary line, cilia as above. *Hind-wing:* ground-colour rather darker than on fore-wings, more brownish, the basal area suffused metallic greenish, a faint white spot in cell followed by a large white broadly wedged-shaped mark, the basis of which is the spot on the discocellulars—*no similar submarginal white mark*. Beyond this a series of 9 ocelli similar to those on fore-wing, the first, in area 1*b* indistinct, the remainder prominent, the last two both in area 7, the series sinuous from 1 to 6, then bent at right angles, 6, 7, and 8 being in line, 9 towards the base of area 7. Marginal area whitish, well separated from the ocellar series, inwardly diffuse, enclosing a double series of fine black crescents except in area 7, each pair enclosing a faint orange spot. Cilia as above, preceded by a fine dark anteciliary line. The veins prominently paler than the ground-colour.

♀. *Upperside, both wings:* brilliant blue, of a deeper shade than in ♂, the margins and costal areas, especially of fore-wing, broadly and diffusely black, enclosing scattered blue scales. Cilia as in ♂. *Underside, both wings:* as in the ♂, but with no spot in cell on fore-wing, and the marginal pale markings much broader and more diffuse. On the *hind-wing* the inner series of crescentic marks almost obsolete, the outer prominent, the two series more widely separated, the orange more conspicuous.

Length of fore-wing, ♂ 15–19 mm.; ♀ 14–18 mm.

The series exhibits considerable variation. On the upperside in the ♂ the black margins vary in width and as to the definition of the inner edge, especially on the fore-wing; in the ♀ the blue suffusion is in some specimens confined to the base of the wings with only a few scattered scales on the disc, and in these specimens the hind-wing bears a submarginal series of diffuse bluish lunules, which in one specimen are distinctly marked with orange. On the underside, the veins, usually very prominent, do not stand out in all specimens, the ocellus in the cell of the fore-wing is as frequently absent as present, the relative prominence of the ocelli as between each other varies considerably, as also does their size; but their heavy white ringing and the extraordinary dark smoky ground-colour are very constant. The orange submarginal markings of the hind-wing, always very pale, in some specimens are barely traceable, in others almost as large as in *P. arene*. The genitalia exhibit marked differences from those of *P. arene*.

28. **Lycaena pheretes pharis** Fawcett.

1910. *Plebeius pharis* Swinhoe, *l.c.*, viii, p. 17.

1 ♂, Thung La, 14,500 ft., 15/7/21; 1 ♂, 1 ♀, Rebu, 14,000 ft., 31/7/21 (*W.*).

29. **Lycaena asiatica** Elwes.

1907. *Lycaena pheretes* race *asiatica* Bing., *l.c.*, ii, p. 352.
1910. *Plebeius asiatica* Swinhoe, *l.c.*, viii, p. 17.
1912. *Lycaena* (*Albulina*) *asiatica* Evans, *l.c.*, p. 983.

1 ♀, E. of Everest, 14,000 ft., 9/8/21 (*B.*).

Evans and Swinhoe are perfectly correct in treating this as a species distinct from *pheretes*. It is confusingly like that species, but has nothing to do with it in reality.

30. **Lycaena janigena**, sp. nov.

(Pl. XXXVI, fig. 4 ♂, fig. 5 ♀.)

1 ♀, 18/7/21; 1 ♂, 19/6/21, Nyenyam, 13,000 ft. (*W.*).

♂. *Upperside, both wings:* deep purplish blue, with a roughish appearance, an even black marginal border, 1 mm. wide or slightly more, cilia white. *Underside, fore-wing:* dull grey brown, the basal area pure grey, an angular, white-ringed, dark mark at cell end followed by a discal series of five broadly white-ringed darker spots, those in areas 4 and 5 much displaced outwardly, the uppermost elongate, shifted inwards slightly, a very faint paler submarginal area, no marginal markings, a fine dark anteciliary line, the pure white fringes deeply but narrowly blackened at the ends of the veins, no markings in the cell. *Hind-wing:* ground-colour much darker and browner than fore-wing, basal area greyer, a basal series of four large white spots, in 7, the cell (double and nearly filling the cell), 1*c* and 1*b*, a similar very large spot at cell end, and a discal series of 7 the same but oval in shape, contiguous, those in areas 1*c* to 5 in a straight row towards apex, those in areas 6 and 7 in line with spot in 5 and forming an angle of about 70° to the others, marginal area, except for a small area close to the discal spots diffusely pale grey, cilia as on fore-wing.

♀. *Upperside, both wings:* uniformly sooty brown, with a few scattered blue scales, cilia darker than in ♂. *Fore-wing:* with a small, faint, grey-ringed spot at cell end. *Underside, both wings:* exactly like the ♂, except for a more ochreous general tone, the presence of a sixth spot (in area 1*a*) in the discal series, and traces of darker marginal markings on the fore-wing.

Eyes smooth; palpi very hairy, moderately long; antennae prominently white-ringed, the club unusually stout, arising rather abruptly. *Fore-wing* costa and inner margin very straight (as in *L. asiatica*), hind margin very convex especially posteriorly. *Hind-wing* evenly rounded. Palpi, thorax, and abdomen below, and legs, light grey.

Length of fore-wing, ♂ 12·5 mm.; ♀ 11·5 mm.

A very distinct little species unlike anything else known to me, but reminiscent of *L. dis.* Gr.-Gr. and *L. luana* Evans on the underside, except for the fore-wing markings and the *pheretes*-like arrangement of the spots on the underside of hind-wing. The blue coloration of the upperside of the ♂ separates it at once from either.

See also supplementary list from Col. Evans (below).

31. **Heodes phlaeas** Linn.

1909. *Chrysophanus phlaeas* Seitz, i, p. 285.
1910. *Chrysophanus phlaeas* Swinhoe, *l.c.*, viii, p. 91.
1912. *Chrysophanus phlaeas* Evans, *l.c.*, p. 989.

2 ♂, 20/7/21; 1 ♀, 7/8/21, Kharta, 12,500 ft. (*W.*).

Very large and of the *eleus* form—not f. *stygianus* Butler.

APPENDIX I.

Whilst the above specimens were being dealt with, Col. Evans very kindly sent me a list, which I append, of the collection he had received from Major Morshead of the Indian Survey Department, who was attached to the Expedition.

This list increases the total number of species recorded from the area by two for certain (*Argynnis gemmata genia* Frühst. and *Lycaena younghusbandi* Elwes), and adds further localities for most of those already recorded.

The species Col. Evans refers to as *L. stoliczkana* is probably what I have recorded as *L. arene*. Felder's figures and description of *L. stoliczkana* are so unlike any form of *ariana* or *arene*, that it seems at present better not to employ the name for the *icarus*-like form with the very bright blue upperside.

The other doubtful species is *L. morsheadi* Evans. The description of the underside of the hind-wing of this fits exactly

the species described above as *L. janigena*, but the underside of the fore-wing (with a large spot in the cell and a broad white submarginal fascia, etc.), and the coloration of the upperside in the male, are so very different that it does not seem justifiable to unite them at present.

A List of Butterflies caught by Major H. T. Morshead during the Mount Everest Expedition 1921.

By Col. W. H. Evans.

1. *Oeneis pumilus bicolor.* Nyenyam, July 18; Tasam, July 27; Phuse La, July 28; Ratsal, July 31; Chodzong, July 31; Kharta Chu, Aug. 13. Apparently common at elevations of 11,500–16,500 ft.

2. *Vanessa cashmirensis.* Nyenyam, July 16; two of the three specimens obtained were strongly melanitic; at 13,000 ft.

3. *Vanessa ladakensis.* Tingri, June 19; Dokcho, June 26; all three specimens very worn; at 14,000 ft.

4. *Argynnis lathonia issaea.* Nyenyam, July 17, at 12,500 ft.

5. *Argynnis clara manis.* Thong La, July 14; Ratsal, July 31; Doya La, Aug. 1; five specimens at 16,000 ft.

6. *Argynnis pales eupales.* Nyenyam, July 18; one male at 13,500 ft.

7. *Argynnis gemmata genia.* Kang Chu, July 23; a few specimens at 14,000 ft.

8. *Argynnis eugenia rhea.* Tulung, July 15; Nyenyam, July 18; Kang Chu, July 23; Doya La, Aug. 1; a few specimens at 13,500–16,000 ft.

9. *Pieris brassicae nepalensis.* Chuphar, July 27 at 11,000 ft.

10. *Colias fieldii.* Tingri July 10; Nyenyam, July 17; Chuphar, July 27; Tasam, July 27; at 11,000–14,000 ft.

11. *Colias berylla.* Tingri, July 12 at 14,000 ft.

12. *Parnassius epaphus sikkimensis.* A single specimen, Kharta Chu, July 14 at 17,000 ft.

13. *Parnassius acco gemmifer.* Menkhap To, June 28; Lungehen La, June 29; Thong La, July 14; Yalep and Tulung, July 15; Tingri, June 25; at 14,000–17,500 ft.

14. *Lycaena stoliczkana.* Common from June 18 to August 12 at from 13,000–15,000 ft.

15. *Lycaena pheretes asiatica.* Ratsal and Chodzong, July 31, at 15,000 ft.

16. *Lycaena younghusbandi*. Menkhap To, June 28; Dokcho, June 26; Ratsal and Chodzong, July 31; a few from 15,000–16,000 ft.

17. *Lycaena morsheadi*, new species. One male, Tasam, 15,500 ft., and one female, Phuse La, 16,000 ft., both on July 28.

Description.

Male, above dark brown, loosely powdered dull blue scales, giving a frosted appearance; a diffused white spot at the end of each cell; border dark brown, $\frac{3}{4}$ millimetre wide; cilia long and white. Female, above, blue scales, very sparse dark border and white cell spots absent. Below fore-wing lead grey, a large white diffused spot in the cell, and, at the end, a contiguous row of large, dark-centred, white spots in 1–6, the last spot being shifted in, a post-discal broad white fascia, submarginal diffused black spots in each space; cilia white prominently chequered with brown at the end of each vein. Below hind-wing dark chocolate brown, but is so covered with very large white spots that the ground-colour can hardly be seen; four basal spots, in 7, double-sized in cell occupying two-thirds of it, in 1 and 1*a*; discal row of 7 spots, those in 1–5 in a straight line pointing to the apex, 6 and 7 shifted right in; post discal, etc., markings as on the fore-wing. Antennae prominently ringed white and with an unusually large club. Eyes smooth. Palpi unusually long. Apex of fore-wing sharp pointed, but not produced; termen highly convex especially near dorsum; hind-wing evenly rounded. Expanse of male 23 and of female 19 millimetres. The nearest ally to this very distinct little species is the *Lycaena luana* I described from S. E. Thibet in J.B.N.H.S., vol. xxiii; the general appearance below is similar and the hind-wings are much the same; but the chequered cilia, the markings on the fore-wing and the blue colouring above render it easily recognisable.

18. *Chrysophanus phloeas*. Kharta district, Aug. 12, at 13,500 ft.

W. H. Evans.

APPENDIX II.

1922 Collection.

The following List of the Rhopalocera taken by Dr. Longstaff and Major Norton on the 1922 Mt. Everest Expedition adds several species to the previous list—but

nothing new—and some further localities. The start was made much earlier than in 1921, which accounts for the interesting capture of *Parnassius hunnyngtoni* again, at the end of April; but only a single specimen was obtained, unfortunately. The bulk of the collection comes from the comparatively low-lying valley of the Arun River, at altitudes of 11,000–12,000 ft.; nothing was taken above 17,000 ft. on this occasion.

The species have been numbered as in the List of the 1921 Collection. An asterisk indicates that the species was not obtained in 1921. The letters (*N.*) and (*L.*) indicate the captures made by Major Norton and Dr. Longstaff respectively.

1. **Papilio machaon sikkimensis** Moore.

1♂, Samchun La, Kharta, 15,500 ft., 20/6/22 (*Major Norton*).
1 ♂, Base Camp, 16,500 ft., 19/5/22 (*Dr. Longstaff*).

2. **Parnassius acco gemmifer** Frühst.

1 ♂, Dongka La, 17,000 ft., 18/7/22 (*N.*).
2 ♂, 1♀, Dongka La, 16,000 ft., 19/7/22 (*N.*).

* 2a. **Parnassius hunnyngtoni** Avinoff.

1916. *Parnassius hunnyngtoni* Avinoff, Trans. Ent. Soc., London, 1915, p. 351.
1♀, Pang La, 17,000 ft., 28/4/22 (*L.*).

4. **Parnassius hardwickii** Grey.

5♂, 1♀, Samchu La, Kharta, 16,000 ft., 20/6/22 (*N.*).
1♂, Samchu La, Kharta, 14,500 ft., 3/7/22 (*N.*).

8. **Baltia butleri sikkima** Frühst.

1 ♀, Phung Chu, Arun Valley, 11,000 ft., 9/6/22 (*N.*).

* 6a. **Pieris canidia** Spar.

1904. *Danaus canidia* Moore, *l.c.*, vi, p. 133.
1907. *Pieris canidia* Bing., *l.c.*, ii, p. 172.
1910. *Pieris canidia* Frühst., *l.c.*, ix, p. 139.
1912. *Pieris* (*Pieris*) *canidia* Evans, *l.c.*, p. 976.

1 ♀, Phung Chu, Arun Valley, 11,000 ft., 19/6/22 (*N.*).

* 6b. **Pieris melete melaina** Böber.

1904. *Danaus ajaka* Moore, *l.c.*, vi, p. 132 (part).
1907. *Pieris napi melete* Bing., *l.c.*, ii, p. 173 (part).
1910. *Pieris melete melaina* Frühst., in Seitz, ix, p. 140.
1912. *Pieris melete melaina* Evans, *l.c.*, p. 976.

2 ♂, 1 ♀, Phung Chu, Arun Valley, 11,000 ft., 19/6/22 (*N.*).

10. **Colias fieldi edusina** Felder.

2 ♀, Arun Valley, 11,000 ft., 9/6/22 (*N.*).
1 ♂, Arun Valley, 11,000 ft., 14/6/22 (*N.*).
1 ♀, Karma Valley, 12,000 ft., 22/6/22 (*N.*).

* 10a. **Colias nina** Fawcett.

1904. *Colias nina* Fawcett, Proc. Zool. Soc., London, p. 139, Pl. 9.
1907. *Colias ladakensis* r. *berylla* Bing., *l.c.*, ii, p. 236 (part).
1907. *Colias berylla* Röber, in Seitz, i, p. 66 (part).
1909. *Eurymus berylla* var. *nina* Swinhoe, in Moore, vii, p. 169.
1911. *Colias nina* Verity, Rhop. Pal., p. 350.

3 ♂, Phung Chu Valley, below Shekar Djong, 14,000 ft., 10/7/22 (*N.*).

14. **Argynnis lathonia issaea** Moore.

1 ♀, Kharta, 12,000 ft., 11/6/22 (*N.*).
2 ♀, Phung Chu, Arun Valley, 11,000 ft., 19/6/22 (*N.*).
1 ♀, Karma Valley, 12,000 ft., 22/6/22 (*N.*).

17. **Argynnis clara manis** Frühst.

2 ♂, Dongka La, 16,000 ft., 18/7/22 (*N.*).

18. **Melitaea sindura tibetana** Fawcett.

2 ♂, Tinki, 13,500 ft., 15/7/22 (*N.*).
1 ♂, Dongka La, 16,000 ft., 18/7/22 (*N.*).
1 ♀, above Phari, 15,000 ft., 19/7/22 (*N.*).

* 18a. **Pyrameis cardui** L.

1905. *Vanessa cardui* Bing., *l.c.*, i, p. 365.

1 ♂, Trangsar Chumbab, 13,000 ft., 23/4/22 (*N.*).
1 ♂, Phung Chu, Arun Valley, 11,000 ft., 17/6/22 (*N.*).

20. **Vanessa caschmirensis aësis** Frühst.

1 ♀, Arun Valley, 11,000 ft., 9/6/22 (*N.*).

21. **Vanessa ladakensis** Moore.

1 ♂, Base Camp, 16,500 ft., 29/5/22 (*L.*).
1 ♂, Pang La, 15,000 ft., 8/6/22 (*L.*).
1 ♀, Kharta Chu, 13,000 ft., 12/6/22 (*N.*).
1 ♂, Phung Chu, 11,000 ft., 15/6/22 (*N.*).

* 21a. **Polygonia interposita agnicula** Moore.

1899. *Polygonia agnicula* Moore, *l.c.*, iv, p. 99.
1905. *Vanessa c-album* r. *agnicula* Bing., *l.c.*, i, p. 372.
1912. *V.* (*Polygonia*) *c-album agnicula* Evans, List, *l.c.*, p. 580.
1921. *P. interposita agnicula* Riley, Ann. Mag. Nat. Hist. (9), viii, p. 596.

1 ♀, Arun Valley, 11,000 ft., 9/6/22 (*N.*).
1 ♂, Arun Valley, 11,000 ft., 14/6/22 (*N.*).

22. **Argestina karta** Riley.

2 ♂, 1 ♀, Pang La, 15,000–16,000 ft., 8/6/22 (*L.*).
3 ♂, Arun Valley, 11,000 ft., 9/6/22 (*N.*).
1 ♀, Chushar, 14,500 ft., 13/6/22 (*L.*).

* 22a. **Argestina nitida** sp. nov.

(Pl. XXXVII, figs. 6–8)

1 ♀, Pang La, 15,000–16,000 ft., 8/6/22 (*L.*).

♂. *Upperside, both wings:* uniformly dark glossy brown with greenish and purplish reflections in certain lights, the cilia light grey with darker markings at the extremities of the veins. *Fore-wing:* no trace of any area of modified scales, or submarginal line, the ocellus present in area 5 but minute. *Underside:* markings arranged as in *waltoni* and *karta*, but the warm chestnut brown of underside of fore-wing is replaced by dull coppery, and the irrorated appearance of the apical area is continued the whole length of the costa, and the yellowish ring of the ocellus is barely discernible: on the *hind-wing*, the three transverse wavy lines are completely lost in the mottled dark brown and ochreous, and the postdiscal row of white points is increased to six in number by the addition of a point in area 1c.

♀. Exactly resembles the ♂ both above and below, except for the

greater size and the increased prominence of the ocellus, which, in the only specimen of this sex obtained, has two white pupils, and for the suffusion of the greater part of the fore-wing with coppery.

Length of fore-wing, ♂ 20 mm.; ♀ 19 mm.

Between Phari and Gyangtse, 13,000–15,000 ft., June 1904 (*H. T. Walton*), 3 ♂, 1 ♀.

Types ♂♀ in B.M.

The genitalia of this species give ample proof of its specific difference from the others placed in *Argestina*. It is the only one of the four completely to lack the area of modified scales on the fore-wing of the ♂, but, as to the rest of its generic characters, agrees exactly with *waltoni* and *karta*.

25. **Paroeneis sikkimensis** Staud.

1 ♂, Tinki, 13,500 ft., 15/7/22 (*N.*).

26. **Lycaena arene** Fawcett.

1 ♂, Dzaka Chu, 14,000 ft., 6/7/22 (*N.*).
1 ♂, Dzaka Chu, 14,000 ft., 7/7/22 (*N.*).
1 ♂, Tinki, 13,500 ft., 15/7/22 (*N.*).

28. **Lycaena pherctes pharis** Fawcett.

2 ♂, near Phari, 15,000 ft., 19/7/22 (*N.*).

29. **Lycaena asiatica** Elwes.

1 ♂, 1 ♀, Karma Valley, 12,000 ft., 21/6/22 (*N.*).
2 ♂, Karma Valley, 12,000 ft., 22/6/22 (*N.*).
2 ♂, Sakithung, 12,000 ft., 22/6/22 (*N.*).

30. **Lycaena janigena** Riley.

1 ♀, above Phari, 15,000 ft., 19/7/22 (*N.*).

30a. **Lycaena younghusbandi** Elwes.

1907. *Lycaena younghusbandi* Bing., *l.c.*, ii, p. 338.
1910. *Lycaena younghusbandi* Swinhoe, in Moore, viii, p. 5.
1912. *Lycaena younghusbandi* Evans, List, *l.c.*, p. 983.
1 ♂, Dzaka Chu, 14,000 ft., 7/7/22 (*N.*).

31. **Heodes phlaeas** L.

2 ♀, Arun Valley, 11,000 ft., 9/6/22 (*N.*).
1 ♂, 1 ♀, Kharta, 12,000 ft., 12/6/22 (*N.*).

O. F. Tassart, del. *Vaus & Crampton.*

BUTTERFLIES OF THE EVEREST EXPEDITION

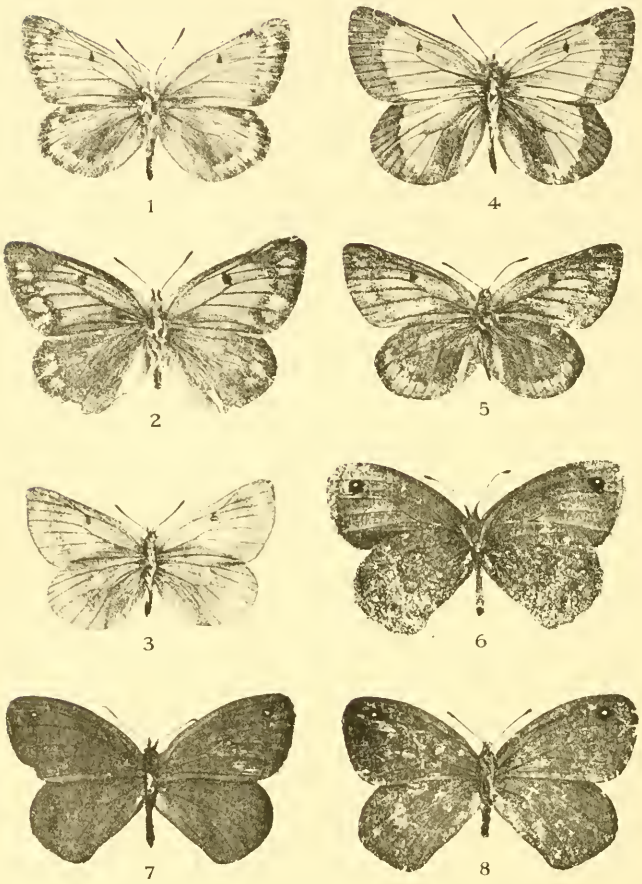
NOTICE TO BINDER.

ERRATA.

PLATE XXXVI.

Figs. 4 to 6 should be as follows:

Fig. 4 should be Fig. 6.
,, 5 ,, Fig. 4.
,, 6 ,, Fig. 5.



H. G. Herring, photo. *Bale, S. & Danielsson, Ltd.*

BUTTERFLIES OF EVEREST EXPEDITION.

Explanation of Plate XXXVI.

Rhopalocera of the Mt. Everest Expedition.

Fig. 1♂. *Polyommatus everesti* Riley.
2–3♀♀. „ „ Riley.
4♂. *Lycaena janigena* Riley. (Type).
5♀. „ „ Riley. (Type).
6♂. *Parnassius epaphus himalayanus* Riley. (Type).
7♂. „ „ *everesti* Riley. (Type).
8♀. „ „ „ Riley. (Type).
9♂. *Colias eocandica tibetana* Riley. (Type).
10♂. *Paroeneis grandis* Riley. (Type).
11♂. *Argestina karta* Riley. (Type).
12♀. „ „ Riley. (Type).

Explanation of Plate XXXVII.

Rhopalocera of the Mt. Everest Expedition.

Fig. 1♂. *Colias dubia* Elwes. (Type).
2♀. „ „ E. of Deva La, 16,000 ft. 27?7?21.
3♀. „ *miranda* (*C. dubia* Elwes ♀ Type).
4♂. „ „ Frühst. (Type), Adams Coll. (B.M.).
5♀. „ „ „. (Type), Adams Coll. (B.M.).
6♂. *Argestina nitida* Riley. Underside.
7♂. „ „ Riley. (Type).
8♀. „ „ Riley.

XIX. *Notes on Endomychid Coleoptera and descriptions of new species in the British Museum.* By Gilbert J. Arrow, F.E.S., F.Z.S.

[Read October 18th, 1922.]

Having had the opportunity of examining the collection of Endomychidae, formed by H. S. Gorham between the years 1888 and 1901, and recently acquired by M. René Oberthür, I have made a few synonymical notes, which are here published. The first collection, containing the species described by Gorham previous to 1888, and including types of Guérin and many described by Gerstaecker from the Deyrolle collection, has long been incorporated in the British Museum.

In the deplorable "scraps" so fittingly called by him Mélanges Exotico-Entomologiques, M. Pic has lately bestowed names in his characteristic manner upon some of the most familiar representatives of this family. I have therefore indicated here the species to which these names are to be relegated. It seems to me very desirable that some representative body should give formal expression to the censure universally felt to be merited by this writer, who hinders the advancement and degrades the standards of Entomology by the wholesale introduction of names accompanied only by remarks indicating the most impudently superficial study.

Finally descriptions of various new species supplementing those described by me in Trans. Ent. Soc. Lond., 1920 (p. 1) are included here. When engaged upon that paper I deferred dealing with the genus *Saula*, the minute species composing it bearing so close a general resemblance that satisfactory conclusions could not be arrived at without a study of considerable series. I have since succeeded in bringing together more than one hundred and fifty specimens of the genus, a large part of them collected by Prof. C. F. Baker, and this fine series has enabled the distribution and characteristics of a previously little-known genus to be elucidated and the number of its species is now more than trebled.

Amphisternus papulatus Gorh. is *A. bellicosus* Gerst.

A. cultratus Gorh. is based upon a specimen of *A. mucronatus* Gerst., in which, owing to its dirty condition, only one subapical spot is distinctly visible.

Trycherus lateralis Pic seems to be *T. longanimis* Thoms.

Ancylopus lineatus Pic is *Indalmus bivittatus* Perch.

A grandis Pic is *I. ephippiatus* Gerst.

A. atricornis Pic is *I. kirbyanus* Latr.

The Burmese specimens referred to *Indalmus angusticollis* Gerst., by Gorham in Ann. Mus. Civ. Genova, xxxvi, 1896, p. 295, belong to another species, which I describe later as *I. distinctus.*

Pedanus Gerstaeckeri Gorh. is *P. quadrilunatus* Gerst.

The type of *Mycetina crubescens* Gorh. from Borneo (described in 1901, not 1902, as stated in Cziki's Catalogue), proves to be *Dryadites borneensis* Friv., as I anticipated in my paper just referred to.

M. brevicollis Gorh. was described from examples of two species mounted on a single card. The one Gorham mentioned as perhaps the female is quite distinct.

Trochoideus rouyeri Pic is the very common and variable *T. Desjardinsi* Guer., and *T. particularis* Pic is evidently a female specimen of the same insect.

The generic name *Lycoperdinella* introduced in my paper having been previously used by Mr. Champion, I propose to substitute *Lycoperdinodes* in its stead.

Stenotarsoides alfieri is "described" by M. Pic from "Indes" and compared with "*medianus*" Gorh. As there is no *medianus*, he probably means *Stenotarsus indianus* Gorh., a very widely-distributed species, of which the type is in the British Museum. I have little doubt that this is M. Pic's *Stenotarsoides alfieri.*

Indalmus distinctus, sp. n.

Black and shining, each elytron decorated with two bright yellow patches of rather indefinite and irregular outline, the first subquadrate, placed just behind the base and touching the lateral margin, with its outer edge excised by a small black spot at the humeral angle, the second transversely oval, placed before the apex and equidistant from the inner and outer margins.

It is rather narrowly oblong in shape. The head is finely punctured, the pronotum more strongly, its sides bisinuate, the front and hind angles rather acutely produced, the base deeply margined and the lateral foveae not quite reaching the middle. The scutellum is short and very transverse. The elytra are fairly closely and

strongly punctured, with the shoulders not prominent and the sides narrowly margined. The prosternum is very narrow between the coxae, the mesosternum bears a carina shaped like an inverted Y, enclosing a rounded tubercle between its arms, and the metasternum is smooth and shining. The abdomen is finely punctured. The antennae are rather slender, the first and third joints as long as the fourth and fifth together and the last three forming a narrow club, the ninth a little longer and the tenth a little shorter than wide, the last obliquely truncate.

♂. The front tibia is armed with a very strong oblique tooth at the middle of its inner edge, the middle tibia has a short tooth just before the middle and is strongly curved from there to the extremity. The fifth ventral segment has a curvilinear emargination.

♀. The front tibiae are straight, the middle ones distinctly and the hind ones feebly, curved in their posterior half.

Length 7–8 mm.; breadth 3–4 mm.

Burma: Toungoo (*G. Q. Corbett*), Karen Hills, Cheba, 27,000–33,000 ft. (*L. Fea*). Assam: Khasi Hills, Nongpow, Silhet, Chandkhira.

Type in the British Museum; co-types in the Genoa Museum and in Mr. O. E. Janson's collection.

Gorham confused this species with *I. angusticollis* Gerst., the males of which have a long slender tooth upon the middle tibia, placed at a third of its length. In the present insect the tooth is very short, though obvious, and is placed near the middle. The emargination of the end of the abdomen in the same sex is not angular, as in Gerstaecker's species.

Pseudindalmus malayensis, sp. n.

Obscure rufus, elytris nigris, singulo rufo-bimaculato, maculis sat magnis, anteriori paulo pone basin sita, ad humerum et marginem externum attingenti, posteriori anteapicali, subtriangulari.

Ovalis, parum convexus, nitidus, corpore supra perspicue sat aequaliter punctato, oculis prominentibus, remotis, pronoto lateraliter intra margines paulo excavato, his antice fortiter arcuatis, posticis fere rectis, basi recto, sulco profundo, medio fossulato, foveis basalibus profundis, rectis, fere ad medium attingentibus, scutello semicirculari; elytrorum lateribus perspicue deplanatis; antennis brevibus, articulo tertio quam secundo perpaulo longiori; pro- et meso-sterno angustis:

♂, antennarum articulo 9° valde inflato, tibia intermedia laevissime incurvata.

Long. 5 mm.; lat. 3 mm.

Malay Peninsula: Singapore (*C. J. Saunders*).

In size and general appearance this species and *P. borneensis* Arrow are almost identical. The coloration is the same, except that the legs and club of the antenna are red and the anterior elytral patch extends to the outer margin and reaches the shoulder. The pronotum and elytra are much more distinctly punctured, the eyes are smaller and farther apart, the base of the pronotum is rectilinear, the sides more strongly excavated within the lateral margins, the basal foveae very deep and the basal groove has a round impression in the middle. The flattened outer margins of the elytra are a little wider than in the allied form.

The type of *P. borneensis* is not, as I supposed, a male. Mr. Saunders has taken a male specimen in Singapore which I believe to be that of this species and which has the ninth joint of the antenna much swollen and the hind tibia dilated posteriorly. The latter forms the best-marked distinction between the two species.

Beccaria 12-punctata, sp. n.

Nigra, parum nitida, pronoti angulis anticis elytrique singuli punctis rotundatis 12 rufis, quarum una basali, duo medianis, et duo subapicalibus, antennis flavis, clava nigra; fere hemisphaerica, convexa, pronoto haud latissimo, minute et crebre punctato, lateribus arcuatis, angulis omnibus fere rectis, basi trisinuato, anguste marginato, foveis basalibus minutis; scutello triangulari, fere laevi; elytris fortiter aequaliter sat crebre punctatis; metasterni medio fortiter haud crebre punctato; antennarum articulis basalibus parvis, 4–7 brevissimis, tribus ultimis sat magnis.

Long 5·5 mm.; lat, 4·5 mm.

Borneo (*Prof. A. C. Haddon*).

The unique type specimen has been surrendered by the Cambridge University Museum to the British Museum.

It is a species easily distinguished from all others by the close puncturation of the upper surface and the more numerous red spots with which it is decorated. It most resembles *B. philippinica* Arrow, but the elytra have ten round spots instead of seven. It is a little larger, the pronotum is relatively narrower and the antennae are less slender, the club larger and almost equal in length to the footstalk, of which joints four to seven are extremely short.

Beccaria cruciata, sp. n.

Fulva, antennarum clava elytrorumque margine toto, sutura et linea mediana recta nigris : fere hemisphaerica, nitida, sat convexa, pronoto laevissime et disperse punctato, parum convexo, marginibus lateralibus fere rectis, antice leviter arcuatis, angulis anticis rotundatis, basi trisinuato, subtiliter marginato, elytris fortiter haud crebre aut regulariter punctatis; metasterni medio abdominisque basi grosse haud dense punctato; antennis gracilibus, articulis 1–8 elongatis.

Long. 4 mm.; lat. 3 mm.

Philippine Is., Mindanao : Surigao (*Prof. C. F. Baker*).

This is very similar to the Bornean *B. coccinella* Arrow, but the colouring is much brighter, and the four elytral patches are enlarged so that the interposed black areas appear to form a narrow black cross. The pronotum and scutellum are entirely pale and the elytral patches roughly triangular in shape, the anterior one very feebly indented at the shoulder. The pronotum is rather more finely punctured than that of *B. coccinella*, its front angles are blunter and the base is finely margined, the elytra are less highly convex and the antennae are longer, the first eight joints being distinctly elongate and the total length greater than the width of the pronotum at its base.

Beccaria pallida, sp. n.

Pallide testacea, antennarum clava elytrorumque margine angusto nigris, hujus parte posticali paulo dilatata, angulis extremis pallidis; fere hemispherica, supra nitida, pronoto lato, laevissime punctato, angulis anticis productis, haud acutis, posticis acutis; elytris distincte sed disperse punctatis; antennis brevissimis, gracilibus, articulo tertio longo.

Long. 5·5 mm.; lat. 4·5 mm.

N. Malabar : Taliparamba (*P. S. Nathan*, July–Aug.).

This is also unique, the type having been received from Mr. E. Ballard.

Pale testaceous yellow, with the last four or five joints of the antennae and a narrow border encircling the conjoined elytra black. This border does not include the scutellum, but extends a little way down the suture behind it, and at the posterior end of the elytra it dilates into a broad subapical patch, the extreme apices being pale.

The body is very broadly oval, almost hemispherical,

and very smooth and shining above, the puncturation being fine and sparse. The head is finely pubescent, the pronotum very broad, lightly punctured, with its sides straight and very divergent behind, feebly rounded in front, the front angles produced but not very sharp, the hind angles rather acute, the base feebly trisinuated, not distinctly margined, the lateral foveae well marked. The elytra are distinctly but sparingly and unevenly punctured. The lower surface is clothed with fine silky hair, and the metasternum has in the middle a large cluster of coarse, evenly distributed punctures. The antennae are very slender but relatively very short, the length being considerably less than the width of the pronotum at the base. The third joint is decidedly longer than the rest.

Beccaria ovata, sp. n.

Nigra, nitida, singulo elytro lunula humerali punctaque subapicali flavis ornato; ovata, convexa, pronoto parvo, sat crebre punctato, utrinque bifossulato, lateribus arcuatis, medio laevissime excisis, angulis posticis paulo productis, foveis basalibus linearibus, basi trisinuato, anguste marginato; elytris punctis magnis et parvis intermixtis inaequaliter sparsis, lateribus pone humeros leviter angulatis, apicibus paulo productis; pedibus modice longibus, antennis gracilibus, articulis 1–8 elongatis, 9 triangulari, 10 brevi, lato, 11 subquadrato.

Long. 8 mm.; lat. 6 mm.

Philippine Is., Mindanao: Iligan (*Prof. C. F. Baker*).

A single male specimen has been kindly presented to the British Museum by Prof. Baker.

A peculiar and isolated species in which the regularly rounded outline, producing in most of the forms so close a resemblance to Coccinellidae, is absent. The oval shape, with the slender antennae and legs (especially the hind ones) prevent such a resemblance in the present case. It is a shining black insect, with an orange half-ring upon each elytron, enclosing a black shoulder-spot, and a round orange spot before the apex. The abdomen is also pale except the basal segment. The pronotum is relatively small and much narrower than the conjoined elytra, finely margined all round, with the rounded outer margins a little interrupted in the middle and the lateral foveae linear. The curvature of the sides of the elytra is also a little irregular, a slight

angle being formed at the widest point; the puncturation is very irregular and the apices are produced.

This is the largest species of *Beccaria* known.

Cyclotoma monticola, sp. n.

Bright red, with the club of the antenna and seven nearly equal and equidistant black spots upon each elytron black, three of the latter near the suture and four near the lateral margin.

Hemispherical in shape and extremely smooth and glossy. The clypeus is rather closely punctured, the forehead scantily, with a very thin, scarcely perceptible clothing of minute setae. The pronotum is very broad, the breadth equal to three times its length, finely punctured, with the lateral margins feebly rounded and all the angles obtuse. The elytra are finely and evenly punctured, with rather broad flattened lateral margins, broadly conjointly rounded behind and not at all produced. The metasternum is strongly punctured and the abdomen rather finely. The basal joint of the antenna is long, the second globular, the third and fourth slender, the fifth to eighth very short, the ninth to eleventh together as long as the seven preceding.

Length 6·5–7·5 mm.; breadth 6–7 mm.

S. India: Nilgiri Hills, Anamalai Hills (*Andrewes*), Kanara (*T. R. D. Bell*). Type in the British Museum.

This species has a much richer colour than its Indian congeners, and is also differently spotted and of more exactly hemispherical shape. It more closely resembles the Philippine *C. coccinellina* Gerst., from which it differs in its deeper colouring, broader prothorax (that of *C. coccinellina* is only two and a half times its length), less closely punctured and pubescent head and the longer first and third joints to the antenna.

Stenotarsus perforatus, sp. n.

Flavus, antennarum articulis 7–10 nigris: ovalis, convexus, nitidus, ubique dense fulvo-setosus, pronoto brevi, lateribus antice valde arcuatis, postice fere parallelis, marginibus latis, basi fortiter marginato, utrinque intra marginem exciso, sulcis lateralibus valde obliquis, antice vix perspicue productis, scutello late transverso; elytris grosse seriatim punctatis, punctis post medium evanescentibus: antennis longitudine ad corporis dimidium aequalibus, articulis 2–8 brevissimis, 9–11 magnis, laxe connexis, 10 transverso, ultimo ovali, ad duos precedentes conjunctim vix aequali.

Long. 3·5 mm.; lat. 2 mm.

Philippine Is.

The unique specimen has been in the British Museum since 1845. It was probably captured by Cuming, like the three other species already recorded from the Philippine Islands. It is a smaller insect, of a bright yellow colour, except for the black intermediate joints of the antennae, probably varying in number, but leaving the terminal one pale, except at the base. It is more narrowly oval than the majority of Oriental Stenotarsi, and the elytra are very coarsely punctured in rows which disappear a little beyond the middle. The broad elevated margins of the pronotum project behind owing to the deep notching of the base at the end of the lateral grooves, which produces the effect of a perforation on each side when the thorax and elytra are closely applied.

Chondria longicornis, sp. n.

Ferruginea, antennis nigris, articulis duobus basalibus ferrugineis ultimoque laete flavo; late ovalis, modice convexa, parum dense aut longe pubescens, antennis pedibusque gracilibus, pronoto haud lato, nitido, lateribus antice leviter arcuatis, postice fere parallelis, marginibus latissimis, postice attenuatis, basi fortiter marginato, utrinque profunde excavato, elytris sat grosse seriato-punctatis, interstitiis minutissime parce punctatis; antennis quam corporem vix brevioribus, articulis 2–8 compactis, brevibus, tertio perpaulo longiori, tribus ultimis elongatis, laxe articulatis, ultimo longissimo.

Long. 3 mm.; lat. 2 mm.

Philippine Is., Mindanao: Surigao.

The unique type has been presented to the British Museum by *C. F. Baker*.

It is reddish-chestnut coloured, with the antennae black, except the two basal joints, which are red, and the last, which is bright yellow. Rather broadly oval, with very slender legs and antennae, and clothed with fine pubescence. The pronotum is rather feebly rounded in front, the lateral margins are broad, narrowed and very prominent behind, the base strongly margined and very deeply excavated at each end just within the raised margins, with the foveae situated within the basal groove and not produced forwards. The elytra bear longitudinal rows of large, not closely-set punctures. The antennae are little shorter than the body, joints two to eight very short and compact and the three last elongated, not flattened, very loosely articulated and equal in length to the preceding

seven, the yellow terminal joint three times as long as it is wide.

Chondria apicalis, sp. n.

Testacea, fulvo-pubescens, pronoto medio paulo infuscato, antennis nigris, articulis basalibus 4 vel 5 rufescentibus ultimoque pallide flavo; pedibus antennisque modice longis, pronoto brevi, subtiliter punctato, lateribus fortiter arcuatis, marginibus latissimis, basi fortiter sat anguste marginato, utrinque profunde fossulato, foveis basalibus valde obliquis, antice leviter productis, scutello lato, triangulari; elytris seriato-punctatis, interstitiis sat crebre punctulatis; antennarum articulis 2–8 brevibus, compactis, 9–11 laxissime connexis, paulo dilatatis, 9 et 10 transversis, 11 ad eos conjunctos longitudine aequali.

Long. 4 mm.; lat. 3 mm.

Philippine Is., Mindanao: Butuan (*C. F. Baker*).

Like all its eight congeners, this is known from a single specimen only. This has been kindly presented to the British Museum by Prof. Baker. It resembles *C. ovalis* Arrow, but is rather larger, with longer antennae, the interstices of the elytra more finely punctured and the large serial punctures more distinct. The elevated margins of the pronotum are wider, the basal groove more deeply impressed and less close to the edge. The deep pits passing under the raised margins at each end of the base form a remarkable feature, but they are a little less conspicuous than in *C. longicornis*.

The two Philippine species are peculiar for the pale terminal joint of the antenna. This is an interesting characteristic of the Endomychidae of several genera in the island of Mindanao. Gorham has described two species of *Stenotarsus* in which this curious feature occurs, viz. *S. tabidus* and *leoninus*. In the latter the last two joints are said to be pale, but in fully mature specimens the terminal one only seems to retain its yellow colour. I have here described a third Philippine *Stenotarsus* with the same characteristic, and it appears again in *Milichius ampliatus*, an Endomychid superficially like but not very nearly related to *Stenotarsus* and *Chondria*. It is evidently a case of a mimetic association, and the bright-tipped antenna may be assumed to be a warning mark.

Stenotarsus tabidus and *leoninus*, of Gorham, just referred to, are described as uniformly coloured, with the exception of the antennae, but a black-spotted form of each

occurs. In the former a black patch may appear in the middle of the pronotum and another in the middle of each elytron; in the latter a spot appears at the base and another near the middle of the outer margin of each elytron.

Genus Saula.

The genus *Saula* seems to be the counterpart in the Oriental Region, to which it is confined, of the mainly African genus *Danae*, the species of which are closely similar, but have invariably a broader thorax, with wide raised margins. The two genera agree in exhibiting remarkable sexual differences in the legs and antennae. With the exception of these sexual features, there is a very close uniformity in size, colour and general appearance, in all the species of *Saula*.

A careful study of the considerable series I have succeeded in bringing together reveals that the genus is a very large one and that the most important and distinctive characters of the species are peculiar to the males. Five species have been named up to the present time, and in none of these has any sexual character been referred to. Although in some of the forms the two sexes are practically identical, in most the antennae of the males are longer or more massive and the tibiae of one or more pairs of legs are bent or dilated in various ways according to the species.

Saula occidentalis, sp. n.

Pallide testacea, antennis (basi excepto) infuscatis; robusta, parum convexa, grisco-pubescens, pronoto brevi, lato, plano, lateribus bisinuatis, angulis anticis paulo productis, obtusis, posticis acutis; elytrorum humeris prominentibus; antennis tenuibus, haud valde elongatis, articulo tertio longo, ultimo duplo longiori quam latiori.

Long. 4 mm.; lat. 2·5 mm.

Bombay: Bandra (*Dr. A. S. G. Jayakar*).

So far as known this species represents the farthest westward range of this Oriental genus.

It is straw-coloured, with the antennae (except the basal part) dark and the extremities of the femora and bases of the tibiae light brown.

The body is rather broad and not very convex, with a fairly close clothing of pale hair. The eyes are not large, separated by twice their radius. The pronotum is nearly

twice as wide as it is long and quite as wide in front as at the base. The front angles are a little produced as rounded lobes and have broad elevated margins which become very narrow at the sides. The lateral margins are gently bisinuated and the hind angles acute. The elytra are not very convex, broad at the base and not much dilated beyond it. The legs are long and slender and the tibiae straight and simple in both sexes. The antennae are slender but not very long, the third joint is distinctly longer than the second or fourth, and the terminal joint is nearly as long as the two preceding ones together.

The male has the antennae a little more slender than those of the female, and the last ventral segment (5th) is slightly pointed behind.

The female has the last ventral segment broader and not pointed.

Saula oculata, sp. n.

Testacea, antennis (basi excepto) nigris tibiisque plus minusve infuscatis: elongato-ovalis, griseo-pubescens, pronoto transverso, plano, angulis anticis obtusis, basi dilatato, angulis acutis; elytris convexis, postice attenuatis; antennis gracilibus, articulis 1–7 paulo elongatis, ultimo duplo longiori quam latiori, oculis magnis, haud late separatis:

♂, antennis gracilioribus, articulo ultimo quam latitudine plus-quam duplo longiori, tibiis posticis apice leviter attenuatis.

Long. 3–5·4 mm.; lat. 2 mm.

Brit. N. Borneo: Sandakan (*C. S. Baker*). Sarawak: Mt. Matang, Quop (*G. E. Bryant*, Dec.–April).

This is a larger species than *S. tibialis* and has markedly larger eyes, the interval separating the latter being little more than the diameter of the eye as seen from above. The pronotum is relatively broader at the base, and the elytra have the shoulders rather less rounded. The antennae are similar, but have usually only three instead of five basal joints pale, and the tibiae are more or less dark (although never black) except at the base. Pale specimens are found, however, in which no darkening is perceptible. The male has very slender antennae (Fig. 3), and the gradual increase in width of the hind tibia ceases at two-thirds of its length and a very slight diminution occurs.

Saula tibialis, sp. n.

Ferruginea, pedibus concoloribus, antennarum dimidio apicali-nigro; elongato-ovalis, breviter griseo-pubescens, pronoto trans-

verso, minute sat crebre punctato, angulis haud productis, posticis acutis; elytris convexissimis, humeris parum prominentibus; antennis gracilibus, articulis 3–7 elongatis, ultimo quam precedenti duplo longiori:

♂, antennis gracilissimis, articulo ultimo duplo longiori quam latiori, pedum 4 anteriorum tibiis arcuatis.

Long. 3 mm.; lat. 2 mm.

Brit. N. Borneo: Sandakan (*C. F. Baker*). Sarawak: Mt. Matang (*G. E. Bryant*, Dec.), Kuching (*J. E. A. Lewis*).

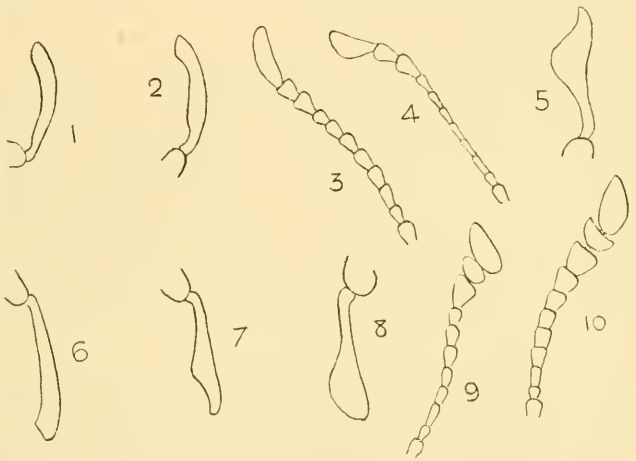


Fig. 1.—Front tibia of *Saula tibialis*, sp. n., male. 2. Front tibia of *S. curvipes*, sp. n., male. 3. Antenna of *S. oculata*, sp. n., male. 4. Antenna of *S. filicornis*, sp. n., male. 5. Front tibia of *S. crassicornis*, sp. n., male. 6. Hind tibia of *S. posticalis*, sp. n., male. 7. Hind tibia of *S. excisipes*, sp. n., male. 8. Hind tibia of *S. clavipes*, sp. n., male. 9. Antenna of *S. malleicornis*, sp. n., male. 10. Antenna of *S. crassicornis*, sp. n., male.

A small species closely resembling *S. curvipes* and *filicornis*, but with the legs and the basal half of the antennae pale. The elytra are rather shorter and more strongly narrowed behind. In the male the antennae are very slender, and the front tibiae are rather strongly, and the middle ones more gently, curved (Fig. 1).

Saula filicornis, sp. n.

Testacea, tibiis infuscatis (basi excepto) antennisque nigris (basi pallidiore); haud robusta, elongata, sat longe griseo-pubescens,

oculis magnis; pronoto paulo transverso, plano, minute sat crebre punctato, lateribus postice parum sinuatis, margine anticofere recto, angulis anticis obtusis, haud productis, posticis acutis; elytrorum humeris parum prominentibus; pedibus modice gracilibus, antennis gracilissimis, articulis omnibus elongatis, clava laxe articulata, articulo ultimo quam precedenti plusquam duplo longiori, leviter arcuato:

♂, tibia antica valde, intermedia leviter, arcuata.

Long. 3·5 mm.; lat. 2 mm.

Philippine Is., Luzon: Los Banos; Mindanao: Surigao (*C. F. Baker*).

A small rather narrowly elongate species, with the eyes large and separated by less than twice their radius, the pronotum narrow, closely punctured, nearly straight at the front margin, the front angles blunt and not at all produced, the hind angles a little acute, the elytra highly convex, rather narrow at the shoulders and attenuated behind. The antennae are very long and slender, and the terminal joint is more than twice as long as it is wide (Fig. 4). In the male the front tibia is strongly curved.

Saula curvipes, sp. n.

Omnino testacea, antennis (basi excepto) nigris; elongato-ovata, grisco-pubescens, pedibus antennisque sat longis, oculis parvis, late separatis; pronoto late transverso, subtiliter punctato, lateribus bisinuatis, angulis anticis parum productis, obtusis, posticis leviter acutis; elytris valde convexis, humeris parum prominentibus; antennarum articulis 1–8 (tertio excepto) sat brevibus, compactis, tribus ultimis laxe articulatis, elongatis, ultimo quam precedente fere duplo longiori:

♂, tibiis anticis arcuatis, intus medio et apice paulo dilatatis, trochanteribusque anticis spinosis.

Long. 3·5 mm.; lat. 2 mm.

Palawan I.: P. Princesa (*C. F. Baker*).

This closely resembles *S. filicornis*, but it is a little more stoutly built, with the legs entirely pale and rather less slender, and the antennae shorter. The pronotum is more transverse and less closely punctured, the three club-joints of the antenna are equally loosely conjoined, but rather less elongate and those of the footstalk are much stouter, the third alone being slightly elongate.

The front tibia of the male (Fig. 2) is rather strongly curved, dilated a little at the middle of its inner edge and again at the extremity, and the trochanter of the same leg is produced into a sharp point beneath.

Saula clavipes, sp. n.

Testacea, femorum apicibus, tibiis antennisque (basi excepto) nigris; elongata, modice nitida, griseo-pubescens, pronoto transverso, minute sat crebre punctato, basi lato, angulis posticis acutis; elytrorum humeris parum prominentibus; antennis gracilissimis, articulis omnibus elongatis, ultimo quam precedente duplo longiori:

♂, femoribus posticis incrassatis, clavatis, leviter arcuatis, subtus antice apicem paulo excisis, tibiarum posticarum dimidio antico tenui, leviter sinuato, dimidio postico fortiter laminato-dilatato, abdominis segmento primo lato, 5 haud angusto, utrinque lobato, 6 fortiter lobato.

Long. 3·5 mm.; lat. 2 mm.

Philippine Is., N. Luzon: Baguio, Benguet (*C. F. Baker*).

Except in the features distinctive of the male, the resemblance between this and *S. filicornis* is extremely close. The antennae are very long and slender, all the joints elongate, the last three very loosely articulated and the terminal one twice as long as its predecessor. The thickened hind femora of the male, a little excised at the posterior edge, and the remarkable almost semicircular flange at the extremity of the tibia (Fig. 8) render the identification of that sex easy. The structure of the abdomen in the male is also remarkable. The fifth segment is broad and deeply excised in the middle, and the sixth consists of two lobes fringed with hair.

S. excisipes, sp. n.

Testacea, antennis (basi excepto) femorum dimidio apicali, tibiisque (basi excepto) nigris: elongata, sat dense griseo-pubescens, oculis magnis, approximatis; pronoto transverso, parum convexo, angulis anticis obtusis, posticis fere rectis; elytris convexis, humeris parum prominentibus; antennis gracilibus, articulo ultimo quam precedenti duplo longiori:

♂, antennis gracilissimis, articulo ultimo quam latiori fere triplo longiori, tibia postica a basi ad post medium gradatim dilatata, deinde intus arcuatim angustata.

Long. 3·5 mm.; lat. 2 mm.

Malay Peninsula : Penang (*G. E. Bryant*, Oct.).

A single pair was taken by Mr. Bryant and presented by him to the British Museum.

This is a rather small species, with convex oval elytra and dark antennae and legs. It closely resembles *S. oculata* Arrow, and, like it, has large prominent eyes, but it is a little smaller, the pronotum is not quite so broad at the base, and the shoulders of the elytra are more rounded. The antennae are very slender, especially in the male, and the hind tibia of the male has a very peculiar form. It is straight, gradually increases in width from the base to two-thirds of its length and is then abruptly narrowed in a curve to the apex, appearing as though cut away at the inner edge (Fig. 7).

This or the next species may possibly be the *S. Biroi* of Csiki (from Malacca). Owing to an unfortunate accident having befallen the Latin phrase in which the coloration of the legs is referred to, it is impossible to determine what that coloration is, and nothing remains by which the identity of the insect may be guessed at.

S. variipes, sp. n.

Flava, antennis (basi excepto) femorum apicibus tibiarumque dimidio apicali nigris; elongato-ovalis, grisco-pubescens, pronoto transverso, plano, lateribus leviter bisinuatis, angulis anticis obtusis, posticis paulo acutis, elytris convexis, haud abbreviatis, antennis sat gracilibus, articulo ultimo elongato, quam duobus praecedentibus conjunctim breviori :

♂, antennis paulo longioribus.

Long. 3·5–4 mm.; lat. 2 mm.

Brit. N. Borneo : Sandakan (*C. S. Baker*). Sarawak : Quop, Lundu (*G. E. Bryant*, Jan., March). Malay Peninsula : Singapore (*C. S. Baker*).

This is distinguishable from all other known species by the coloration of the legs, both the femora and tibiae being yellow, with the terminal part black. The antennae are black, with the two basal joints pale. The eyes are rather smaller than those of *S. oculata*, the antennae not quite so slender, with a distinctly shorter terminal joint, the prothorax is shorter and broader, and the elytra are a little longer and less convex. The legs are similar in both sexes, but the antennae of the male are a little longer than those of the female and the fifth ventral segment is rather narrower.

S. posticalis, sp. n.

Testacea, pedibus concoloribus, antennis (basi excepto) nigris; elongata, griseo-pubescens, pronoto transverso, haud dense punctato, angulis anticis paulo productis, posticis acutis, haud productis; elytris parum elongatis, humeris modice prominentibus; antennis gracilibus, articulis omnibus elongatis, ultimo quam latiori dimidio longiori:

♂, tibiis posticis arcuatis, postice paulo dilatatis.

Long. 3·5 mm.; lat. 2 mm.

Tonkin: Hoabinh (*R. Vitalis de Salvaza*, Aug.).

I have seen only a single male specimen of this insect, which resembles *S. tibialis*, but the antennae are black, with the exception of the two basal joints, the anterior angles of the pronotum are a little produced and rather broadly margined, and the elytra are a little less oval and convex. The antennae of the male are still more slender than in that sex of *S. tibialis*, all the joints being distinctly elongate, but the terminal joint is shorter and only half as long again as it is wide. The hind tibia in the same sex is curved and a little dilated posteriorly, instead of the front and middle tibiae, as in *S. tibialis* (Fig. 6).

S. crassicornis, sp. n.

Rufo-testacea, antennis (basi excepto) nigris; elongato-ovalis, grisco-pubescens, pronoto transverso, convexo, minute sat crebre punctato, angulis posticis acutis, haud productis; elytrorum humeris parum prominentibus; antennis crassis, haud brevibus, articulo basali ovali, inflato, tertio et ultimo paulo elongatis, ceteris brevibus, 8–10 transversis:

♂, antennis crassioribus, planatis, tibiis anticis intus (basi excepto) fortiter deplanatis, tortis, margine interno apice valde reflexo, tibiis intermediis pone basin arcuatis.

Long. 3·5 mm.; lat. 2 mm.

Philippine Is., Bukidnon, Tangcolan (*C. F. Baker*).

Prof. Baker has sent a single specimen of each sex.

The whole of the legs and the two basal joints of the antenna are of the same pale colour as the body, the remaining part of the antenna alone being black. The general form differs little from that of *S. curvipes*, but the pronotum is rather more convex. The antennae are very distinctive. They are rather stout and long, with the first, third and last joints only distinctly elongate, and

the eighth, ninth and tenth rather transverse. The terminal joint is pear-shaped. The antennae of the male are more massive than those of the female, and the front tibiae of the same sex are still more curiously formed (Figs. 5, 10). They are dilated internally from a little beyond the base and the broad flange strongly reflexed in its terminal part. The middle and hind tibiae are slender and the former rather strongly curved beyond the base.

S. malleicornis, sp. n.

Testacea, tibiis tarsisque fuscis, antennis nigris, articulis duabus basalibus pallidis exceptis; robusta, nitida, subtiliter haud dense pubescens, pedibus longissimis, antennis parum longis, articulo ultimo fortiter transverso, praecedenti paulo transverso, ♀ haud longiori quam latiori; pronoto modice lato, crebre et minute punctato, lateribus ante basin sinuatis, angulis posticis acutis; elytrorum humeris prominentibus; abdomine subtus 6-segmentato:

♂, pedibus longioribus antennarumque articulo ultimo latissimo; segmento ventrali tertio postice leviter bilobato, 4 et 5 abbreviatis:

♀, segmento ventrali 4 abbreviato, 5 paulo producto.

Long. 4 mm.; lat. 2·5 mm.

Philippine Is., Mindanao: Surigao, Kolambugan, Davao, Butuan, Iligan (*C. S. Baker*).

This is a relatively large and solidly-built insect, the elytra being broad at the shoulders and dilating distinctly to beyond the middle. The legs are very slender and the antennae of an entirely peculiar form. The first three joints are elongate (especially the third), the succeeding six about as long as they are broad, and the last two strongly transverse, the terminal one produced internally, especially in the male (Fig. 9). In the latter sex the third ventral segment is emarginate in the middle and a little produced on each side, and the last three segments are very short. The eyes are also larger and closer together than in the female.

XX. *Notes on the Biology of some British Neuroptera (Planipennia).* By C. L. Withycombe.

[Read October 18th, 1922.]

Plates XXXVIII–XLIII.

The present account is offered as a small contribution to our knowledge of the earlier stages of British Neuroptera. The writer is only too conscious of its incompleteness, but it is to be hoped that further work will supply the omissions. The Megaloptera, including Sialidae and Raphidiidae, also the Mecoptera or scorpion-flies, must be treated of later and separately. Excluding these two last-mentioned orders from the Neuroptera, we have a very uniform grouping of insects, although the Coniopterygidae stand somewhat apart.

As regards anatomy, this note is little more than a preliminary one, being merely a summary of the more striking characteristics of the order. External structure of imagines has been almost entirely omitted, as this is generally better known.

To avoid repetition, it is assumed when describing individual larvae, that the general characters of larvae of the family are known. Each description is therefore more or less comparative, and points not mentioned are typical of the family as a whole. It is to be hoped that, with such brief descriptions, the drawings will facilitate identification of the various species. With the exception of Hemerobiid larvae, every species should be fairly easily determined. Larvae of *Hemerobius* are very difficult to identify. I have thoroughly compared the chaetotaxy of every part of the body. It is constant in general plan throughout all the species and where variable is not specific. Pigmentation, arrangement of sclerites, etc., are likewise useless characters. While, with a knowledge of habitat, one may, after some experience, fairly certainly determine a larva, the position is none the less very unsatisfactory, and I regret that I am unable further to elucidate matters.

Tables illustrating life-cycles have only been employed to illustrate points of interest, or where such are considered

desirable. They are selected from a large number of similar examples.

At the commencement of the account of each species, a short summary of salient features is given. This is not intended to be a description of the species, but merely an enumeration of certain characters which appear to me to be typical and useful.

I am indebted to several gentlemen for their kind assistance, and would now express my sincere thanks to Prof. H. M. Lefroy for having afforded me every facility for the carrying out of this work, and for help in many ways; to Dr. J. Waterston and Dr. A. Roman for the identification of all parasitic Hymenoptera; to Mr. F. Laing, who has named for me a large number of aphids, psyllids and coccids, on which Neuropterous larvae have been found preying—unfortunately the complete list cannot be included; to Mr. W. E. China, without whose help in obtaining the necessary material, the life-histories of *Sympherobius pygmaeus* and *Micromus paganus* would not have appeared.

General Features and Life-cycle of Neuroptera.

The egg is of oval shape, sometimes flattened. It is laid on its side or stalked at the anti-micropylar pole. The chorion may be smooth or pitted from the impressions of the follicle cells previous to laying. Ornamentation cannot always be ascribed simply to this cause, *e. g.* the projections on the chorion of the egg of *Boriomyia concinna*, which occur in the place of pits. The micropylar apparatus often takes the form of a knob. This may be slightly stalked or flattened and inconspicuous.

The embryology will not be described here, but the hatching is of particular importance (Plate XXXIX, figs. 2–4). There is always a saw-like egg-breaker, and a complete skin, sheathing all the appendages, is cast before leaving the eggshell. While referring to this skin as the amnion, I do so believing it to be the correct designation, although I have as yet not definitely proved this to be the case. The embryo, then, when about to hatch is enveloped in the amnion, and, as part of this amnion, lying with its anterior third over the labrum-clypeus of the future larva, is the saw-like egg-breaker. This saw lies in the middle line, mainly over the mouth-parts, but, as stated,

its anterior portion reaches as far as the clypeus. Since the embryo rests with head and abdomen bent ventrally, the anterior extremity of the egg-breaker will be situated a little posteriorly to the micropyle.

The hatching of *Nothochrysa capitata* is quite typical and as follows. When hatching is due, blood is forced to the labrum-clypeus, which swells under the pressure and so presses against the anterior portion of the egg-breaker. In all Chrysopids this bears a projecting tooth, which quickly penetrates the chorion. Now the entire fore part of the body presses outwards and the saw slits the egg still further down. The head gradually protrudes and then the prothorax. Now it may be seen that the labrum-clypeus is considerably ballooned out and pulsates at ninety or one hundred to the minute. It projects in a semicircle from a line drawn between the mandible bases. Behind this, an almost transverse segment includes the bases of the antennae. Later, these transverse divisions become drawn backwards in the middle, as will be seen.

Five minutes after hatching commenced, the amnion skin splits at the back of the head. Now the escape of the larva is rapid. Antennae and jaws are drawn out of their sheathes and the egg-breaker is left behind. Finally the young larva frees itself entirely and stands out from the eggshell, supported only by the tip of the abdomen, which is still within. It is now only ten minutes since hatching commenced.

Examining the larva at this stage, the head is wholly soft, enclosed in a thin skin which will shortly harden. The soft integument of the head is now seen to be continuous, from the dorsal to the ventral surface anteriorly between the jaws. Thus the position which should reveal a mouth opening is covered by membrane. This is important, as it shows how the mouth is at first closed. Now a process of retraction of the central part of the head is going on. Gradually the labrum-clypeus, once swollen with blood, shrinks and is drawn back until it no longer projects, but forms a triangular piece with a slightly curved anterior margin between the jaws (Plate XXXIX, fig. 1). A groove now marks the division between labrum and clypeus. The labrum is the anterior margin of the clypeus. The antenna bases now lie at the extremities of another V-shaped groove, (frontal suture) almost parallel to the clypeus boundary, and once nearly transverse as previously noted. The membrane

closing the mouth opening is gradually drawn out of sight, within the mouth cleft, as the head capsule hardens. The mandibles and maxillae at first lie parallel, but after hardening they engage with one another to form the sucking jaws.

Now the larva grasps the eggshell and withdraws the anal extremity. Larvae sometimes rest on the empty eggshell for one hour, but others have remained as long as thirty hours before wandering away in search of food.

The first instar differs from the second or third-instar larva in many respects besides size. Two may be mentioned. The empodium between the tarsal claws is better developed. In first-instar Hemerobiids and Chrysopids it is trumpet-shaped. In the second and third-instar Hemerobiid the trumpet form is lost and the empodium is small, but in Chrysopidae this trumpet shape persists. The empodium is both an adhaesive and tactile organ. When at rest it is often not applied to the surface. Should an aphid brush this empodium, the larva at once responds, but often an aphid may brush the body or even the eyes without the slightest notice being taken. Chrysopid and Hemerobiid larvae have very poor vision and detect food mainly by the sense of touch, the tips of the maxillae being extremely sensitive.

Returning to the first-instar larva, the second noteworthy point of difference is in the number of setae and their form. In Chrysopids the setae of young larvae are usually curled at their tips or hooked, and most larvae at first carry some debris on these. Later, hooked hairs are only found on those forms which habitually carry debris. From a single lateral wart, in first-instar Chrysopids, there generally proceed only two setae. In the later instars, of course, there is a brush of setae. All first-instar larvae have fewer body setae than in later life.

There appear constantly to be only three larval instars. I have found no more in any case.

The body of the second and third-instar larva is more or less fusiform, slightly flattened dorso-ventrally. The head is flat, encased in chitin which shows few sutures, though such sutures are less pigmented as a rule. With its base as the anterior margin of the head, between the jaws, is a triangular plate of chitin, of which the apex is approximately in the middle of the dorsal surface of the head. This is the fused frons, clypeus and labrum. The labrum is often very

indistinct, but sometimes marked off as the anterior margin of the clypeus. In the larva of the Australian *Psychopsis elegans* (12) the labrum projects as a distinct lobe, and this is also the case in Coniopterygidae, where it roofs the sucking spears. The mandibles are almost straight, or curved, often serrate at their apices. They are grooved ventrally, and the edges of this groove are generally further grooved or keeled to engage with complementary grooves in the maxillae. The mandibles and maxillae when fitted together leave a central channel along which the blood of victims can flow. The two appendages are not fixed, but are free to move upon one another longitudinally, in fact such movement always occurs when an insect is being sucked. Probably movement prevents particles from clogging the extremity of the lumen. When this play of maxilla against mandible occurs, the hinge joint between stipes and cardo of the maxilla bulges out each time the latter is pulled back. The extremity of the maxilla is generally blunt (not in Coniopterygidae) and bears sense hairs. Since the larvae have but poor vision, the sensitive tips of the maxillae are used to search out food. The larva walks with a side-to-side motion of the head, especially noticeable in Hemerobiids, and thus brushes against aphids, etc., lying in its path, with the sensitive ends of the maxillae. These aphids are then sucked. The labium is always reduced, but is provided with palpi, except in *Sisyra*. The eyes are generally of six ocelli, but not always. Antennae are simple, but vary in the number of joints.

The body is soft. Terga may be complete (*Sisyra*) or reduced to small sclerites, as muscle attachments (*Hemerobius*, etc.). The prothorax is of three more or less distinct parts: (1) a small fore part rarely extended in life; (2) a large middle portion bearing legs below and the main sclerites, whatever they may be, above; (3) a small hind division with a pair of spiracles laterally.

The legs have a full complement of joints, but there is a tendency to fusion of tibia and tarsus, complete in the hind legs of Myrmeleonidae. The tarsus consists of only one joint. There are two tarsal claws, one in *Sisyra*. No clue is given by the first-instar *Sisyra* as to how this reduction has taken place, but if evidence from the examination of ant-lions can be accepted here, then the reduction has been by fusion of two claws laterally rather than by loss of one. *Sisyra* has no empodium, but in the other genera

various forms occur. The trumpet-shaped empodium is probably a primitive, rather than a highly specialised organ, since it occurs only in the first instar of the Hemerobiidae and also in the archaic Psychopsidae (12).

The abdomen is of ten segments, if we include the anal papilla as a segment. This latter, bears two more or less evaginable appendages, covered with hairs and best developed in *Osmylus*. It is used as an additional leg, and also occasionally as a brush to clean the body immediately on hatching. When a moult is about to take place, the larva attaches itself by this papilla, at the same time secreting a yellowish sticky fluid, undoubtedly excretory and from the Malpighian tubes. The abdomen is without appendages except in *Sisyra*, which has ventral tracheal gills. The first eight abdominal segments are provided with spiracles, the only other spiracles being a pair on the prothorax. Chaetotaxy is very similar throughout the order, and, I think, important, but it can hardly be dealt with here.

After two moults, in each of which the skin splits along the thorax and posterior part of the head, the larva becomes full fed and spins a cocoon of whitish silk, using the anus as a spinneret. The cocoon is generally remarkably small as compared with the size of the larva and of the emerging adult. There is often a tendency to double structure.

The pupa is a *pupa libera*, but the appendages are not movable until just before emergence. The pupa exhibits all the characters of the adult, but the appendages and abdomen are shorter, especially is this true of the wings. The head is furnished with strongly chitinised pupal mandibles, with which a hole is cut in the cocoon at the end of pupal life. The antennae lie over the wing rudiments at the sides, the legs ventrally. Spines are often present on the back of some of the segments, which aid in escape from the cocoon.

In due course the pupa bites a hole in the cocoon, and generally crawls out of it completely on to a suitable support. Here the pupal skin splits along the dorsum of the thorax, the imago withdraws itself and may walk an inch or so before the wings commence to expand. Wing extension occurs basally at first, the tips of the wings extending last of all. The whole process is very rapid. Before taking to flight, a black or dark brown pellet of larval excrement is deposited. This is hard and shining, enclosed

in peritrophic membrane. In Coniopterygidae the excrement is deposited in several black viscous masses.

The adult will not be described here, as its form is generally well known, but the following point appears of interest. On the lateral valves or paraprocts at the extremity of the abdomen in both sexes is a pair of circular, dome-shaped, unpigmented spots. These are covered with small sensory hairs and are evidently of use in pairing, clearly so in *Osmylus*. I consider that these spots are possibly reduced cerci.

The eggs in the ovaries of the female are at first not fully developed, but mature in a few days. Animal food hastens maturation more than does sugar. Sometimes insects will not lay eggs if only supplied with sweet food, though the latter will always attract imagines, even from a distance.

All the British forms are mainly crepuscular or nocturnal in habits and are attracted to light.

Winter may be passed in any stage, with the apparent exception of the egg, but ? *Boriomyia concinna*.

The length of life of a male imago is generally only a few weeks; of a female, up to three months.

Internal Anatomy.

Larva (Plate XXXIX, fig. 5).—The mouth is closed at first by membrane, as described in the account of the hatching larva; later, the mouth opening appears to be closed by close application of roof and floor, the one being moulded to fit the other by ridge and groove. The channels from each jaw unite in a Y-shaped joint, and then the common channel (pharynx) takes an oblique course dorsalwards. The oblique part of the channel has its walls a little more strongly chitinised than the rest of the pharynx, and attached before and behind are muscles, which by their contraction serve to widen the lumen. Thus we have a pharyngeal pump formed, supplying the necessary suction for feeding. Now the alimentary canal once more runs horizontally. The oesophagus dilates behind into a crop. After a slight constriction the gut continues as mesenteron or stomach, which normally would not be lined with chitin, but from the hind part of the oesophagus there is secreted a delicate chitinous cylinder, the peritrophic membrane, which hangs free the entire length of the stomach and thus protects the gastric epithelium from actual contact with the stomach

contents. At the pyloric end of the stomach the alimentary canal is suddenly constricted, and the hind-gut becomes in fact a solid cord of degenerate cells. Thus there is no connection with the anus. At the same point of constriction eight colourless Malpighian tubes are given off radially. Two of these are free distally, but the remaining six once more join the alimentary canal lower down and run in contact with it for a short distance. Then there is a swelling, formed by forward growth of epithelial cells over the ends of the Malpighian tubes. Continuous with this swelling is a reservoir, which gradually tapers and is continuous with the rectum. Contrary to common statements on Neuropterous larvae the six attached Malpighian tubes are functional throughout life and secrete a yellowish-brown viscous fluid, which is probably waste, though it serves a useful purpose. It stands to reason that with all the fluid nutriment taken during life, some must be excreted, even though that food is so digestible that the entire solid waste can be stored. The attached Malpighian tubes possibly serve as drains to the mid-gut. When the larva wishes to attach itself, as for ecdysis, the anal papilla is furnished with a drop of the viscous adhaesive fluid. The reservoir serves to store the fluid temporarily, and if a larva be suddenly shaken off a leaf, in its endeavours to secure a hold at once, quite a quantity of this excretion may be poured out. In the third instar, the cells in the middle and partly posterior of the Malpighian tubes swell, and the nucleus of each cell in this region becomes ramified as in true silk glands; in fact, these cells secrete silk instead of the previous gummy fluid. The ramification of the nucleus is not at all well marked in our British forms, and degenerates shortly after spinning has commenced. In Myrmeleonidae, however, it is very distinct and apparently of longer duration. The silk secreted collects in the reservoir and is later spun out through the anus. Coniopterygidae (Plate XLIII, fig. 5) differ in having only six Malpighian tubes, four of which are attached and secrete silk. I have never seen a ramified nucleus here, though curious changes take place. In the Megaloptera, Raphidiidae, the larva has also six Malpighian tubes, and four of these are looped, but no silk appears to be secreted.

Salivary glands consist of a pair of simple tubular glands lying mainly within the head, and running one to the base of each maxilla. There appears to be another small gland

in the swollen base of the maxilla. The salivary glands furnish a secretion which probably serves for extra-oral digestion and also is poisonous (vide *Osmylus*). A hungry *Chrysopa* larva once pierced the skin between my fingers and left a small white pimple, very irritating for two hours, so that, together with noted effects on insect victims, I think we may say that the secretion is decidedly poisonous.

The nervous system of the larva consists of brain, sub-oesophageal ganglion, three thoracic and eight abdominal ganglia. In Coniopterygids (Plate XLIII, fig. 6) there is marked concentration and reduction in size of abdominal ganglia, there being only three in *Conwentzia*. Wing buds and reproductive organs are first visible in the third-instar larva.

Pupa.—The anatomy varies with the age of the pupa. Needless to say great changes take place in this short time. A food reservoir to the oesophagus is present. The gizzard is more distinct, as also are the developing reproductive organs.

Imago (Plate XXXIX, figs. 6–17).—The internal anatomy of the imago differs from that of the larva mainly as follows. There is a median dorsal food reservoir running back from the oesophagus. This, on first emergence, is filled with air, and is possibly filled up to increase the pressure within the pupal skin previous to emergence. It is supplied by ramifications of two large tracheae from the second abdominal spiracles. Often the food reservoir is laterally placed, and one example has been seen in which a complete reservoir was present on one side and a rudimentary one on the other. There is a gizzard with longitudinal rows of chitinous teeth within. A peritrophic membrane is, as before, always present. The lumen of the hind-gut is now open for the passage of excrement, but six of the eight Malpighian tubes are still looped and loosely united distally to the hind-gut. Malpighian tubes are colourless, except in imagines of *Osmylus* and *Sisyra*. There are six globular rectal glands which probably secrete a lubricant fluid, especially when the larval excrement is passed.

The salivary glands are of filamentous general type, but may branch distally. They lead to the hypopharynx by a short common duct, but posteriorly are doubled along the sides of the oesophagus in the prothorax, being recurrent to just behind the head. Also there is a thin walled gland, often bilobed, to each maxilla.

The testes lie dorsally in the hind part of the abdomen. They may be separate, or enveloped in a common yellow scrotum. Vasa efferentia lead ventrally, one on each side of the alimentary canal to the vesiculae seminales, which are large. Ventrally a ductus ejaculatorius leaves these and runs to the "penis."

Ovaries are meroistic (polytrophic), each of eight to twelve egg-tubes, the tubes being attached longitudinally in pairs. Accessory glands are present at the base of each oviduct, large in *Nothochrysa*. Cement glands are paired in the female, but generally only one is fully developed, the other being small. They run into the vagina, and may secrete silk in *Sisyra*, cement in *Osmylus* and *Hemerobius*, and egg-stalks (= cement) in *Chrysopa*.

In working out the anatomy, resort has been had largely to micro-dissections under water, in addition to microtome sections. The most careful work from sections alone has in the past led to misinterpretations, and especially is this so upon such points as the number of Malpighian tubes. Many contradictory statements have been made. Anthony (1) in some excellent work on *Sisyra* states that the number of Malpighian tubes is five, of which three are attached distally and two are free. My dissections have generally revealed eight Malpighian tubes in *Sisyra*, six being looped as usual, but it must be said that sometimes no more than seven have been definitely found. Hagen (5) gives seven as the number of tubes in *Osmylus*. Here I have always found eight. In *Chrysopa*, where the common number is also eight, I have two cases in which there were *quite definitely* only six tubes. Evidently there is occasionally some variation.

Colour and Markings.

Colour is produced in several ways. The metallic lustre of the eyes is a diffraction effect, since pigment here is always dark crimson or black. Chitin pigmentation is always brown, varying in intensity. It is fairly constant in distribution for a given species. The head markings of larvae are due to pigmentation of chitin. Hypodermal pigment is common and fairly constant for a species. The body markings of Chrysopid larvae and green colour of adults, latero-dorsal bands of Hemerobiids, etc., are due to this form of pigmentation. Colours produced by body contents, alimentary canal, fat body, etc., are not so reliable

as specific characters and vary somewhat. The markings of Coniopterygid larvae are almost entirely of this nature, but the black markings of *Semidalis* larvae are due to hypodermal pigment. In most larvae there is a dark median longitudinal line which pulsates usually in a wave forwards, but appearing to reverse once or twice every few minutes. This is produced as follows. The dorsal vessel lies immediately under the skin, and is of transparent colourless contents (blood). It is bounded laterally by opaque fat body. Thus we have a transparent longitudinal window through which the gut contents are visible in varying shades of brown. The pulsation of the dorsal vessel accounts for the occasional disappearance of this dorsal line.

It is remarkable that a colour pattern will persist more or less from larva, through pupa to imago, and that green and red appear to be interchangeable pigments. This is always more or less true, but strikingly illustrated in *Chrysopa vulgaris*. The larva has a dark crimson line on either side of the central yellow area. The pupa has a pink line on either side of a yellow dorsal vitta. Later pink turns to green. Now the imago has a yellow dorsal vitta bounded by darker green. Some forms in winter become reddish, thus reverting to early pupal coloration. Other examples could be given in Hemerobiidae, etc.

The Larvae of Neuropterous families known to occur in Britain may be briefly tabulated as follows:

A. Tarsus with one claw. . . . . **Sisyridae.**
(Entirely aquatic.)

AA. Tarsus with two claws.

B. Empodium trumpet-shaped, conspicuous. **Chrysopidae,** and 1st-instar *Hemerobiidae.*
(Terrestrial.)

BB. Empodium not trumpet-shaped.

C. Jaws short and inconspicuous, covered above by labrum. . . . . **Coniopterygidae.** *Coniopteryginae.*
(Terrestrial.)

CC. Jaws easily visible.

D. Jaws inwardly curved. . . . . **Hemerobiidae.**
(Terrestrial.)

DD. Jaws not inwardly curved, straight or almost so.

E. Jaws elongate, slightly curved outwards. Larva amphibious. . **Osmylidae.**

EE. Jaws straight, needle-like. Larva terrestrial. . . . . **Coniopterygidae.** *Aleuropteryginae.*

Family I. OSMYLIDAE.

We have one British species, *Osmylus chrysops* L. The structural characters of this are typical of the family. Larva amphibious.

Osmylus chrysops Linnaeus.

Wing expanse 44–47 mm. Colour dark fuscous, wings hyaline with blackish-brown spots.

The head is of an orange colour in life, with three ocelli on the vertex, in addition to the usual pair of compound eyes. Thorax and abdomen dark brown, the latter with one more or less distinct white spot on either side of each segment. Wings ample, densely reticulate. In fore-wings the humeral cross-vein is not markedly recurrent. Costal field broad. Subcosta and radius are confluent in region of pterostigma. But one sector to the radius.

This large and beautiful insect cannot be mistaken for any other of the British Neuroptera. It is slow on the wing, and rather reminds one of an ant-lion in appearance. Its favourite haunts are streamsides in wooded districts. Here, within a radius of ten to twenty yards, a few dozen specimens may occur and often no more for miles. This local occurrence is no doubt correlated with the feeble flight and sluggish habits of the species. Time of appearance from May to July.

Two or three days after pairing, eggs are laid (Plate XXXVIII, fig. 6). These are firmly attached by their flat sides to a surface, not on moss, etc. The eggs are placed closely in contact, side by side, in a straight or slightly curved row of from two to twelve in number. It is not often that eggs are laid singly. The egg is 1·8 mm. in length, of long oval shape but rather flattened. The chorion is reticulated, and there is a white micropylar knob. At the micropylar pole the egg is somewhat drawn out, giving the knob a slight pedicel; the opposite pole of the egg is rounded. The colour is at first whitish, slightly yellow. In five or six days it has darkened to brown, and later, especially just before hatching, the colour is ashen. After an incubation period of twenty-two days, with an average temperature of 69° or 70° F., the larva escapes by a slit in the eggshell extending from just behind the micropylar knob on the upper

side of the egg. This slit is made by a very long, saw-like egg-breaker (Plate XXXVIII, fig. 7). As previously described, the first change of skin takes place when only head and part of thorax are free from the eggshell.

At first the chitin covering of the body is soft, and the colour of the larva is pale brown, but, after resting by the side of the egg-cluster for an hour or so, the colour darkens and the integument hardens. Many larvae remained clustering round their empty eggshells for a day or two before dispersing.

The first-instar larva is fusiform, about 4 mm. long, and dark fuscous in colour. At first only the tips of the jaws are castaneous, but later they are wholly so. The anterior part of the prothorax is whiter than the rest of the body. The early larva differs very little from the full-fed larva, except in the following minor points. The number of setae per segment is less. Thus each dorsal transverse row, of which there are two to each segment, is composed of only about four setae. The empodium between the two tarsal claws is more tapered and longer, ending in a short, curled lash. With these exceptions the description of the full-fed larva will apply equally well to the first instar.

On first hatching, the fore part of the alimentary canal contains a bubble or two of air, as in *Sisyra*, and possibly this prevents the larva from sinking out of its depth in water.

The second-instar larva has an increased number of setae, and the empodium is quite as in the third-instar larva.

Description of Full-fed Larva (*third instar*).
(Plate XXXVIII, fig. 4.)

Length about 15 mm. from tips of jaws to anal extremity. Head and jaws dark castaneous; thorax and abdomen dark fuscous; legs paler, somewhat whitish. Body covered with strong blackish setae.

The head is rounded, slightly shorter than broad, strongly chitinised and dark castaneous in colour, but with a fine median lighter line posteriorly. The eyes are each composed of six ocelli. Antennae are three-jointed; in colour, fuscous. The first joint is large, about twice as long as broad. The second is slender, about six times the length of the first. Except at each end, the second

joint has a number of transversely placed sclerites on the dorsal side, giving a false impression of segmentation. At the distal end of the second joint is a small process, placed externally. The third joint of the antenna is approximately the same length as the first, but is very slender and tapers to end in a long bristle. The jaws are almost straight, long and tapering. They are curved slightly upwards and outwards. Both mandibles and maxillae are serrate internally near their extremities, the barbs being more numerous than usual. The mandible is grooved ventrally, and a sucking tube is completed by each maxilla being applied to the mandible. The maxilla is blunt and sensory at its apex, basally it is swollen. Stipes and cardo are clearly represented (Plate XXXVIII, fig. 5), and may be seen in motion when the larva is feeding, since in this species there is far more play between mandible and maxilla than I have noticed in any other form. The labium is reduced, narrow and triangular, clearly divided longitudinally into two. Each half bears a single bristle and also a five-jointed palpus. These labial palpi are slender, the terminal joint tapering. The middle joint is the shortest. Regularly spaced over the head are a few stout, blackish setae.

The prothorax has a large dorsal tergum, this not being divided into two sclerites, as is more usual in Neuropterous larvae. Upon it are three transverse rows of blackish setae. Anteriorly the prothorax appears whitish, but even here there is a small dorsal sclerite. Ventro-laterally, in front of the coxae of the first pair of legs, are two sclerites on each side. The hind portion of the prothorax bears laterally a pair of projecting spiracles. The surrounds of all spiracles are orange in colour. Meso- and metathorax have each on the dorsum a pair of sclerites, these not meeting in the middle line, as is the case in the prothorax. There are two transverse rows of setae to each of these segments, the rows terminating in a prominence on each side bearing two setae.

The legs are well developed with distinct coxa, trochanter, femur, tibia and tarsus with two simple tarsal claws. Between the claws is a tapering empodium, covered at the tip with fine hairs.

The abdomen is wholly of leathery texture. There is one transverse row of setae per segment, the anterior row being only represented by a pair of setae, placed latero-dorsally. The first eight abdominal segments bear spiracles, each being raised on an orange-coloured prominence. Behind each spiracle is a larger prominence, bearing a pair of strong bristles. Ventrally the abdomen is lighter in colour in the middle line and setae are fewer and smaller. The 10th abdominal segment, or anal papilla, is naked and smooth, with a pair of eversible processes armed with recurved, chitinous hooks.

Although all Neuropterous larvae have, to some extent, similar eversible processes, these appear to be best developed in *Osmylus*. After stabbing a large *Chironomus* larva, or other prey, with its jaws, the anal processes are everted to obtain a firm hold.

The larva lives on the wet mossy margins of streams, etc., and is amphibious in habits. It is generally sluggish, but if the surface film of water in contact with it is disturbed, even some millimetres away, attention is at once actively directed to that spot. From various experiments, conducted with larvae in small depths of water, I think the sensitive parts are situated at the tips of the maxillae and in the empodia, as in *Chrysopa*. Structure would tend to confirm this. If a movement is detected in the moss, or wet substratum on which the larva is walking, at once there is a stabbing downward of the sucking spears, until these strike a living object. A *Chironomus* larva, larger than the *Osmylus* larva, is quickly paralysed and then leisurely sucked of its juices. At first young larvae were offered aphids, but although these were hampered by their wet surroundings, the *Osmylus* larvae appeared to find them difficult to manage. An aphid, about the same bulk as a newly hatched *Osmylus* larva, continued to walk for two minutes after being stabbed by the latter. With *Chironomus* the poisonous action of the *Osmylus*' saliva appears to be more rapid, and with a large *Osmylus* a full-grown *Chironomus riparius* larva dies often in ten seconds. As mentioned, at first young *Osmylus* were fed upon aphids, under the impression that a normal-sized *Chironomus* larva would be too large for them to manage, but such is not the case. If the *Osmylus* larvae be supplied from the first, with mud containing *Chironomus*, they will probe this effectively and quickly feed up. From the fauna of places where I have taken *Osmylus* larvae, I am quite sure that the natural food is Dipterous larvae.

The length of each instar depends on food supply and temperature. Larvae well supplied with food first moulted at the end of fourteen days. Other larvae have been retarded by lack of food. Winter is passed as a larva in the second or third instar, generally the second.

At the end of April or beginning of May a cocoon is spun, still among the damp moss, in nature. This is of thin, but closely woven yellowish-white silk, irregularly oval in form, usually 1 cm. long by ·8 cm. broad. Moss is

incorporated with the silk, but more for support than for concealment. Now the larva rests within, the head and tip of abdomen being bent ventrally. At some time the jaws are broken off to short stumps (Plate XXXVIII, fig. 5), and then the pupa is disclosed. This breaking of the jaws, in one case observed, could not have occurred earlier than one day before pupation.

The pupa is of quite normal form; all the appendages are free, though not movable until just before the escape of the imago. A pair of well-developed pupal mandibles are present. These are symmetrical and have each a deep notch internally. Dorsally, on each of abdominal segments 3, 4 and 5, is a transverse ridge of strong, hooked spines, no doubt of assistance in escaping from the cocoon.

With a temperature averaging 70° F. the pupal stage lasts from ten to twelve days. Thus one example spun up 1/5/22, pupated 17/5/22 and emerged 28/5/22; another spun up 5/5/22, pupated 21/5/22 and emerged 2/6/22. Emergence takes place in morning or evening. The pupa bites an irregular slit in the cocoon with its mandibles and walks to the nearest support free of damp moss. The pupal skin splits along the back of the thorax and the imago escapes. Later, an elongated, dark brown, shiny pellet of excrement is deposited, as usual.

Pairing is most peculiar and has never, to my knowledge, been observed before. Certainly Hagen (5) missed the curious courtship. The main fact is that the male calls and attracts the female, not vice versa. Tillyard (12) mentions a single case of a male of *Psychopsis* attracting a female, but no details are given. Otherwise I think we may say that in *Osmylus* alone among Neuroptera has this strange phenomenon been observed.

It will be noticed that, in life, the apex of the abdomen of the male is much swollen and the 8th tergite is enlarged and rounded. If this tergite is carefully dissected off, one may see lying just below it, on each side, a sac pigmented blackish within and well supplied with tracheal branches (Plate XXXVIII, fig. 9, *sg*). These sacs open immediately behind the 8th tergite on each side and are eversible to a length of about 4 mm. They are, in fact, eversible scent glands. On the second day after emergence, as twilight is setting in, the male crawls to a position in which it can freely hang down and display the tip of its abdomen. The wings are raised away from the body and the eversible glands are

extruded to their full extent (Plate XXXVIII, fig. 8). They are white and translucent, curved slightly outwards. Thus the male rests the whole night through. It rarely flies and is less active than the female. The first male I observed "calling," continued to repeat the performance every night for a week and hardly moved its position at all during that period, but I had no females then. Later I secured both males and females and witnessed the entire pairing.

The male everts his scent glands, and almost immediately females within a foot or two become agitated and wave their antennae vigorously. Next, they walk or fly towards the male and commence caressing the scent glands with their antennae and palpi. The male withdraws the glands and turns round to meet the female. Male and female caress with antennae waving, and may thus walk round each other for a minute or so. At last the male carefully bites hold of one of the fore coxae of the female, on whichever side of her he may be, and both insects bend the tips of their abdomens to meet each other. The female's abdomen passes over that of the male and then completely over the apex of the male's abdomen. The female's abdomen bears ventrally at its apex two flattened rod-like valves. These pass under the end of the male's abdomen. Thus the tip of the female's abdomen completely grasps that of the male, passing over and below. Now, the rod-like valves of the female are levered forward and anteriorly upward to seize the "penis" of the male as with forceps. Thus the pair rest, and the male now relinquishes his hold of the female's fore leg. The whole performance of pairing is very leisurely, and occupies several minutes. From time to time, peristaltic contractions of the male's abdomen may be noticed, and the female levers with the rod-like valves as though to extract something from the male's abdomen. This indeed is the case, for in from ten minutes to an hour a large white spermatophore is withdrawn and remains projecting forward from the tip of the abdomen of the female, the rod-like valves lying just below it (Plate XXXVIII, fig. 11). So large indeed is this spermatophore, that having previously dissected a male, I thought that the whole of the vesiculae seminales had been accidentally withdrawn and that consequently the male would not pair again. Not so, however; I have seen eight pairings all precisely and in detail the same, and, moreover, one male may pair two or three times. Hagen (5) mistook the spermatophore

for the everted vagina of the female, but he certainly would not have made this mistake had he seen its possessor later devouring it, as often happens.

The spermatophore is about 4 mm. long, white in colour, but yellowish in the centre. It consists of four rounded lobes and a short attaching stem. Within a few minutes of parting from the male, the female bends her head under the body and commences to devour the nearest lobe of the spermatophore. When this lobe has been devoured, her appetite is for a time satiated, but if not, the male usually interferes and caresses her. Then he waits and watches for an hour or more, and generally the spermatophore is not further mutilated in that time. When finally the female walks away, the spermatophore constantly impedes her progress, and it either hitches in some object and is pulled away, or is completely devoured, or may remain dried up and still attached for a day or so. Generally no sign of it is visible the morning after.

A female may pair two or three times during life, but once is sufficient for all the eggs laid to be fertile. About thirty eggs were laid by each female. Food taken as imagines was jam, aphids, etc. They will also often devour one another when no other food is provided.

The internal anatomy does not materially differ from that of other Neuroptera. In the larva, the salivary secretion is undoubtedly more poisonous and rapid in its action than in any other species observed. The greater part of the oesophagus and stomach in early larval life contains, mixed with the fluid food, a large number of air bubbles. These are small and of fairly uniform size. I imagine they are mainly of use in decreasing the specific gravity of the larva, but the possibility of respiration by this means should not be overlooked. If a young larva is watched while walking in water which just covers the back, it will be seen to halt once or twice and thrust its sucking spears up through the surface film for a second or two. This I believe it does to draw air into the gut, and, seeing that the spiracles cannot function under water, possibly the action is respiratory. Personally I regard these bubbles of air in the gut as a reserve supply for use when the larva is submerged, since tracheal gills, similar to those of *Sisyra*, are absent.

There are eight colourless Malpighian tubes, six of which function in the greater part of their posterior two-thirds as

silk glands, in the last instar. Hagen gives seven as the number of Malpighian tubes, but I have never seen this number in *Osmylus*.

The adult gut is of usual pattern, with a large food reservoir (Plate XXXVIII, fig. 9). The six silk secreting tubes are still slightly attached distally to the hind-gut. As in the larva, they first run forward from their point of origin and are then recurrent to where the ends are attached to the hind-gut. The first portion of the Malpighian tubes is colourless, but the recurrent portion, approximately coinciding with the previous silk secreting part of the larva, is pigmented with dark brown. This also occurs in *Sisyra*.

In the male the testes are united and covered by a common yellow scrotum (Plate XXXVIII, fig. 10). This lies under tergites 7 and 8, mainly the latter. Posteriorly, two distinct vasa efferentia run back. These are yellowish until they become convoluted into a small knot. Thence they are dark crimson-brown in colour and pass ventrally one on each side of the hind-gut to enter the vesiculae seminales from below. Vesiculae seminales are large whitish structures, yellow centrally, with two anterior recurrent lobes and on each side with a small, somewhat coiled accessory diverticulum. The ductus ejaculatorius runs off from below, and its extremity can be seen externally as a small white papilla between the claspers. It is not a true penis. How such a large spermatophore can pass through such a small duct I cannot say.

The anatomy of the female does not call for special comment in the present paper.

Family II. SISYRIDAE.

Small insects of dark colour. The genus *Sisyra* is typical of the family. Larva aquatic, feeding within or upon freshwater sponges.

There are three British species, *Sisyra fuscata*, *S. terminalis*, and *S. dalei*. I have seen all stages of the first two species, and they are hardly distinguishable. The following account refers mainly, however, to *Sisyra fuscata*, which is the commoner of the two.

Sisyra fuscata Fabricius and S. terminalis Curtis.

Wing expanse 12–14 mm. Colour wholly dark fuscous. Wings unmarked. There are no ocelli. In the fore-wings there is no

recurrent humeral vein. The costal field is narrow. Sc and R_1 coalesce near the apex of the wing. Only one sector leaves the radius.

Likely to be confused with *Sympherobius elegans* or *inconspicuus*, but the venation is quite different. *Sisyra terminalis* differs from *S. fuscata* in the tips of the antennae being whitish.

Sisyra occurs as the imago throughout the summer, but most abundantly in May and June along the banks of rivers and canals, or lakes. It is rather sluggish, and may be beaten from shrubs and trees, especially alders, overhanging the water.

Eggs are laid in depressions of leaves, *i. e.* along the veins, etc., also on wood piles and other objects standing in, or overhanging the water. They are placed in clusters of from one to twelve, often quite irregularly. Over the batch the female then spins a white silk web, very like that of the Psocoptera. The silk strands are drawn across in parallel lines; then changing her position slightly, the female cross-hatches the first strands with another layer at a different angle. Generally there are three or four layers of silk, so that the eggs are barely visible. In Psocids, of course, the eggs can usually be plainly seen through the silk covering.

Each egg is ·35 mm. long, of elongate oval shape and pale yellow colour. In form it resembles the egg of *Hemerobius*, but the micropylar knob is somewhat more flattened and the chorion is not markedly reticulate. At the end of a week no appreciable change in colour has taken place, but the eyes are visible as reddish spots. These then darken and the head also becomes slightly darker, but until just before hatching the egg is still mainly yellow. In fourteen days at 63° F., eggs hatched. The larva saws a slit in the chorion with its egg-breaker (Plate XXXVIII, fig. 1) and often also cuts through the silk covering of the eggs by the same means. Then the amnion skin is cast, before completely leaving the egg, and the young larva drops on to the water. Bending the tip of the abdomen up to the back of the head, the larva then slowly squirms over and forces itself below the surface film. When submerged, the larva floats midway in the water with head, legs, and tip of abdomen bent under itself ventrally. It will be seen that in the thoracic region the gut contains a

bubble of gas, and this is of such size as to render the larva of the same specific gravity as the water. For a time it drifts aimlessly, but if the water be disturbed, it swims by jerkily straightening the abdomen two or three times, at the same time using the legs. This swimming is not very effective and after three strokes the larva rests for a time, to make another attempt after an interval. What does the larva do under natural conditions? I have tried it in the presence of a freshwater sponge, *Ephydatia fluviatilis*. It floats about until a current of water from the sponge is felt, then it becomes active and strikes out towards the sponge. Little progress is made, however, and I am quite sure that in nature the larva drifts rather than swims into contact with the sponge. Having now gained a foothold, the larva does not hesitate to probe into the sponge body with its sucking spears, and soon the gut is seen to contain food. Thus the true food of the larva is from the sponge itself, and does not consist of insect larvae, etc., living within the sponge.

The newly hatched larva (Plate XXXVIII, fig. 3) is about ·5 mm. long, exclusive of jaws. The head is dark blackish and rounded, and is the broadest part of the body at first. The body is almost as broad as the head in the thoracic region, but tapers gradually to the tip of the abdomen, where there are a number of long black setae. Apart from the matter of size and general proportions, the following differences are noticeable from the full-fed larva.

Antennae are five-jointed, the terminal joint being small and narrow, terminated by a bristle. The jaws are short and fairly stout, being only about twice the length of the head. The proximal half is thicker, becoming narrower distally. Palpi are absent throughout the whole of larval life. The thorax bears two blackish sclerites to each segment, those of the prothorax closely approximating in the middle line (? fused). Internally, but visible through the chitin body walls may be seen the bubble of gas in the anterior part of the alimentary canal and also some yellowish-white fat body lying under the hypodermis. The only other patch of this is at the apex of the abdomen; otherwise the body is transparent. The legs have only one tarsal claw. The tergites of the abdomen are less distinct than in the later larva. I have been unable as yet to find any trace of abdominal gills in the first-instar larva.

Description of Full-fed Larva. (Plate XXXVIII, fig. 2.)

Length about 5 mm. Hairy, and somewhat oval in shape when resting. Colour pale olive green or brownish, the gut contents showing through in the mid-body, rosy or orange.

The head is small and rounded, pale in colour. Projecting laterally are the black eyes, each composed of six ocelli. Antennae are fifteen- to sixteen-jointed, long and slender. The thirteenth joint bears a long bristle externally. The fourteenth is rather spindle-shaped and more blackish than the rest. The terminal joints are small. The jaws are extremely long and slender, composed of closely applied mandibles and maxillae as usual. They are very flexible and in life can be curled up or down, especially at the apices, reminding one in their movements of the proboscis of a Lepidopteron, though, of course, not quite so flexible as this. As generally carried, however, they are almost straight, curved at the tips slightly outwards and downwards. Labial palpi are entirely absent. The body is provided dorsally with a complete chitinous tergum per segment. These dorsal shields are of a brownish colour, with a pale median line running through each. Latero-dorsally there is a pair of bristle tufts per segment, each arising from a wart-like projection, and having two or three lighter spots on the chitin round it. There is also one prominence, bearing a tuft of setae, on each side of all the segments. On the 8th abdominal segment the prominences and bristles are considerably longer. The 10th abdominal segment, or anal papilla has a pair of eversible appendages, but these are rarely used. Ventrally the body is paler in colour and soft, but with several sclerites in the thoracic region. The legs are remarkable in that there is only one tarsal claw. From each of the first seven abdominal segments, ventral to the spiracles, arises a pair of jointed, leg-like tracheal gills, each with two tracheae. These lie near the venter, but not touching it. The first gill is largest, but only two-jointed and with a recurrent projection near its base. The succeeding appendages are three-jointed and the projection is progressively less marked on each, from second to last. In life these gills are kept in exceedingly rapid vibration, so that the ventral side of the body appears hazy below. This vibration is far more rapid than in the gills of *Cloëon* larva, for instance. Intermittently vibration ceases.

I think we may safely say that the larva of *Sisyra* has been derived from an earlier form with shorter jaws, as in *Osmylus*. This suggestion is supported by the fact that the young *Sisyra* has short and rigid jaws. I must confess

myself very disappointed to find that the first-instar larva has no trace of two tarsal claws, or apparently of palpi, though further work may reveal something. A forerunner of *Sisyra* probing mud for Dipterous larvae, as does *Osmylus*, might well have discovered in the sponge (which usually contains such larvae) an easier method of obtaining food.

Larvae live on the outside of the sponge and probe it at intervals, or they may enter the canals. The long setae covering the body often entangle debris which serves for concealment. Full-fed larvae may be found all the year round, and circumstantial evidence points to several broods in the year, the main one being in May and June. This year, when eggs were just hatching, in early August, full- and half-grown larvae were also found in the same locality. Nevertheless it should be stated that no pupae have been taken later than July.

When full fed, the larva leaves the water and spins a small yellowish-white cocoon 4 mm. by 3·5 mm. of oval shape. This consists of an outer, coarse, yellowish silk network, and inside, a finer white cocoon. On the walls of a bridge crossing a river or canal, cocoons may often be found in great numbers. In one locality the larvae regularly cross a tow-path ten feet to a bridge wall and then ascend this to under the eaves of the bridge, twelve feet from the ground, before spinning up. There is a great mortality in the cocoon, in nature. About one-third die as larvae and are found covered with white mould. Some die as pupae, and yet others are parasitised by a Hymenopteron which lays an egg beside the resting larva.

The pupa is not peculiar and is at first of the same colour as the larva, later darkening and apparently emerging in about two weeks. The pupa often leaves the cocoon completely before disclosing the adult, but sometimes remains within, after having as usual bitten a hole for its escape.

More evidence is necessary on several points. Larvae may be found in winter, and probably hibernation is normally as such, but I hope to make further observations. The difficulty of breeding *Sisyra* is only that of keeping the sponge alive, which so far has proved impossible for more than a week or so. The larva feeds upon both *Spongilla lacustris* and *Ephydatia fluviatilis*.

The imagines pair readily in captivity, shortly after emergence, at dusk. There is no previous ceremony. The

male pairs laterally with the female exactly as in most moths. After about three to five minutes the female is left with a small white spermatophore attached to the tip of the abdomen. This she immediately devours, so that in no case have I secured one perfect for examination. It is apparently spherical, but slightly lobate. Eggs are laid at night, often only a few hours after pairing.

Of the internal anatomy it may be noted that in the imago the food reservoir is connected to the oesophagus by a rather long, narrow duct. The Malpighian tubes, eight in number (? sometimes seven), are colourless in the larva, but pigmented brown, except anteriorly, in the adult, as in *Osmylus*. Salivary glands are simple and recurrent as in *Hemerobius*, but at their ends, just behind the head, have two short branches. The cement gland (Plate XXXIX, fig. 16), developed in the female, is of long oval form, with a short, slightly swollen duct. It probably serves in *Sisyra* as the silk gland. In the male, the testes are enclosed in one yellow oval scrotum, as with *Osmylus*, but the two vasa efferentia come off from this ventrally about the middle, or somewhat posteriorly. Vesiculae seminales are large and much lobate, but of slightly different form from those of *Osmylus*. With the exception of these points, the anatomy follows the general Neuropterous type.

Family III. HEMEROBIIDAE.

There are twenty-five British species.

Psectra diptera, exceedingly rare.
Sympherobius, four species. Three noted here.
Hemerobius, ten species. Five noted, others not common in the south of England.
Boriomyia, five species. Four noted.
Micromus, three species. *M. paganus* described.
Megalomus hirtus, very rare.
Drepanopteryx phalaenoides, very rare. Life-history given by Morton and Standfuss (7).

Small insects, generally of brown colour. The eggs (Plate XL, figs. 12–14) are sessile, laid on their sides. They are whitish in colour and of long oval shape. The chorion is often pitted, and there is a knob-like micropylar apparatus. A saw-edged egg-breaker is developed (Plate XL, figs. 9–11).

The larva (Plate XL, figs. 1–8) is fusiform, somewhat flattened dorso-ventrally. The body is smooth except for two or more transverse rows of fine hairs per segment. The head is small and rounded; general markings consist of a wedge-shaped central mark and the sides of head also darker. Head pigmentation is of little use in separating the species. Each eye consists of a group of six ocelli. The antennae arise each from a prominence between the eye and base of mandible. They are three-jointed, the first joint being small, the second and third about equal in length, narrow and tapering to appear almost as one joint. They are transversely marked with many small blackish thickenings. In *Sympherobius* the constriction between joints two and three is more marked than in other Hemerobiids. The third antennal joint terminates in a bristle. The sucking jaws are inwardly curved, fairly short and stout, composed of mandibles and maxillae as usual. The mandible is acute, grooved ventrally, with three or four barb-like serrations near the apex internally and other serrations of a different character less apically. The maxilla is grooved dorsally, blunt ended, with sense organs. The labium is reduced, with two labial palpi, each four-jointed. The terminal joint is longer than the others and rather fusiform, banded transversely with blackish markings, as are the antennae. Sometimes the terminal joint shows signs of subdivision into two near its base.

The prothorax is divided into three, as usual. The middle division bears the semilunar sclerites, the posterior subsegment laterally the spiracles. Meso- and metathorax are rather similar to each other and bear each a pair of smaller sclerites serially homologous with those of the prothorax. There are also, in various parts of the body, less noticeable sclerites, lying in folds of the integument. The legs are well developed, with a full complement of joints. Above each joint is a chitinous thickening or rim, which is very distinct in Hemerobiid larvae, especially at the knees, appearing as a black ring. Tibia and tarsus are not very freely movable. There are two tarsal claws, simple, but more or less dilated basally. The empodium of the first-instar larva is trumpet-shaped and is used as an adhaesive organ. In the second and third instars the empodium is reduced and pad-like.

The abdomen consists of ten segments tapering to the last. The first eight bear each a pair of spiracles laterally

and have a soft integument. Segment 9 is more strongly chitinised though small. The 10th segment, or anal papilla, has a triangular sclerite on each side, and between these, more posteriorly, one similar but reversed sclerite dorsally, and one ventrally. The anal papilla bears also a two- or four-lobed eversible pad which serves to retain hold on a surface.

No absolutely reliable characters have been found for distinction between different species of *Hemerobius* larvae.

For pupation, a loose elliptical cocoon of more or less double structure is spun, with silk from the anus.

The pupa has all the appendages free, but does not move them until just before the appearance of the imago. The wings are held at the sides, the antennae lie curled slightly upon these and the legs close together ventrally. There is a pair of strongly chitinised pupal mandibles with which a hole is cut in the cocoon, for emergence. The back is often provided with special short bristles to aid in escape from the cocoon.

The pupa makes its way out in due course and climbs on to a suitable support. Here, the skin splits along the dorsum of the thorax, the imago appears and assumes the adult form. An hour or two after, the larval excrement is deposited as a cylindrical, shiny, black pellet.

Pairing takes place laterally, as in most Lepidoptera, and at night. If there is a spermatophore, which I suspect is actually the case, it is devoured rapidly by the female. I have never seen one.

The internal anatomy of Hemerobiids (Plate XXXIX, fig. 6) differs from other Neuroptera mainly in the following points. The salivary glands of the imago are simple, recurrent and tubular. Of the female cement glands, or homologues of those of Chrysopids, etc., one is tubular with a tuft of diverticula at its distal extremity. The other is simple though more or less dilated, longer than the first mentioned in *Hemerobius*, shorter in *Micromus* (Plate XXXIX, fig. 17). There are two globular accessory glands at the posterior end of each ovary, and ducts from these run into the oviducts. The testes of the male are separate, each enclosed in a yellow globular or kidney-shaped scrotum. They have, of course, separate vasa efferentia. The larval anatomy is typical.

Sympherobius pygmaeus Rambur.

Wing expanse 8-10 mm. Our smallest British Hemerobiid. The wings are dark brown in colour, but lighter than those of *S. elegans*. There are two radial sectors in the fore-wings. Veins dark brown with whitish interruptions. At base of fore-wings, veins are paler in colour. Hind-wings wholly pale. The small size, but two radial sectors, and white dotted veins, render this quite distinct from all other species of British Hemerobiidae.

As far as my observation goes, this species is confined to oaks. As a rule it is decidedly uncommon, but occasionally appears, locally, in abundance. The insects may be beaten from oak, from June until September, although there does not appear to be more than a single brood.

Eggs are laid on oak leaves in similar positions to those chosen by the Coniopterygidae, *i.e.*, at the extreme margin of the leaf, on the under surface. At other times they may be found alongside the main veins, on the underside. Rarely two or three eggs are deposited in one leaf margin, but generally they are placed singly. The egg is ·42 mm. long, oval, with bluntly rounded ends and a very small, inconspicuous micropylar knob. It is of general Hemerobiid pattern, with a granular pitted chorion, the ends of the egg are, however, more rounded, and the micropylar knob is relatively smaller than in *Hemerobius*. At first the colour is white and translucent, later darkening slightly to greyish. Hatching takes place in ten to twelve days, and just before this happens the brown segmentation and eyes of the embryo are visible from without.

The newly hatched larva is approximately ·6 mm. long, pale brown in colour, with a blackish head. It much resembles a larva of *Hemerobius* and moves with a rapid side-to-side motion of the head. The main difference from a *Hemerobius* larva now is in the distinct segmentation of the antennae into three joints; *Hemerobius* having the second and third joints similar, appearing continuous as one. Also the palpi are relatively thicker and swollen distally. The second-instar larva is very similar to that of the third instar.

Description of Third-instar Larva. (Plate XL, fig. 1.)

Length when full fed about 4-5 mm. Body smooth, fusiform, and relatively slightly broader than that of *Hemerobius*. Colour creamy-white with dark brown latero-dorsal longitudinal bands.

Head small, wholly dark fuscous, but with a narrow V-shaped, lighter mark in the centre. Antennae short, about the same length as the head, dark fuscous. The terminal joint is smaller and narrower than the previous joint. Jaws shorter than the head, fuscous, but castaneous at apices. Palpi thicker than antennae. Basal half of palpus white, banded with dark fuscous. Terminal joint wholly pale fuscous. Below, the head is white.

Body creamy-white, with dark brown latero-dorsal bands, most marked in thorax. Prothorax with a pair of latero-dorsal brown bands, in which are imbedded two elongate, dark brown sclerites. Meso- and metathorax with latero-dorsal bands represented by a pair of large spots per segment, in which are a pair of small dark sclerites.

In the abdomen the latero-dorsal bands continue, but are less distinct and more broken. In the anterior part of each segment a brown mark from these extends laterally. A dark median dorsal line runs from the hind part of the thorax along the abdomen. Underside of body mainly white. Legs short, fuscous.

The larva of *Sympherobius* can at once be distinguished from that of *Hemerobius*, by the short antennae and jaws, and the stout palpi.

Winter is passed as a free larva under bark, etc., *not* within a cocoon.

Eggs laid.	Hatched.	Av. Temp.	1st moult.	2nd moult.	Cocoon.
19/7/22	31/7/22	61° F.	8/8/22	20/8/22	? in spring
3/8/22	11/8/22	62° F.	20/8/22	26/8/22	—

Larvae were fed upon *Phylloxera punctata* Licht., and *Chionaspis salicis* L. upon oak, and probably this is similar to their natural food. The imagines feed greedily upon any aphids, and have thus been kept alive for over two months, during which period many eggs were laid, all fertile.

Sympherobius elegans Stephens (= **striatellus** Klap.).

Wing expanse 10-12 mm. A small dark species with two radial sectors in the fore-wings and venation wholly dark fuscous. Somewhat resembles *Sisyra fuscata* and *Sympherobius inconspicuus*, from both of which it can be separated in possessing two radial sectors.

The species occurs on beeches generally, as far as I have seen, but never commonly. My only locality is Epping Forest, where a few are taken every year from June to August.

One egg has been obtained. It was laid on the underside of an oak leaf, alongside a vein, and was of a general Hemerobiid form. Length ·51 mm., colour white, slightly yellowish. The young larva much resembled that of *S. pygmaeus*, but was darker in colour. In the second instar it died, being then almost uniformly blackish-brown, though slightly lighter at the sides of the thorax.

Sympherobius inconspicuus MacLachlan.

Wing expanse 10-12 mm. A dark brown or blackish species. Fore-wings with three radial sectors, venation uniformly dark fuscous. Likely to be confounded with the last or with *Sisyra*, but the number of sectors in the fore-wings will at once distinguish.

The species has been taken on furze by the late Mr. Dale. Personally, I have found it locally common on Weymouth pine, *Pinus strobus*, in June and July. In a pine plantation, only certain trees are selected, the great majority failing to yield any specimens. *Pinus sylvestris* is not a favoured tree as a rule, but *Pinus strobus*, infected with *Chermes strobi* Htg. *Chermes* has been found on all trees on which *S. inconspicuus* has occurred, but I am not sure that this aphid was the main attraction.

Eggs are laid on the insides of the ensheathing scales at the base of a bundle of five needles. They are deposited singly, or sometimes two together. Each egg is ·53 mm. long, of elongate oval shape, yellowish-white in colour, with a pitted chorion and small micropylar knob. In general form it does not differ from the egg of *Hemerobius*. The micropylar knob is relatively larger than that of *S. pygmaeus*. In a few days the colour darkens to yellow and then to orange, and just before hatching, the eyes of the embryo are visible from without, also the segmentation, as brown transverse lines. In thirteen days with an average temperature of 62° F., hatching takes place.

The larva is at first about ·7 mm. long. The head is fuscous, rest of body fulvous. The head hardly tapers at all posteriorly and is uniformly dark brown. Antennae short, and as in other species of *Sympherobius*, distinctly divided into three joints, the terminal one narrowest and

ending in a bristle. Jaws are rather shorter and stouter than in *Hemerobius*. Palpi three-jointed, the terminal joint swollen, and longer than the terminal joint of antennae.

No larvae lived more than a few days. They refused all aphids offered, and *Chermes* could not then be obtained.

Hemerobius nitidulus Fabricius.

Wing expanse 14-16 mm. General colour castaneous; wings unmarked, uniformly brown in colour. There is no distinct black spot in the basal third of fore-wings. Each of the macrotrichia on the veins arises from a dark brown spot, hence the venation is closely dotted with darker. Three radial sectors. Pterostigma reddish brown.

A common species on Scots fir, at least within a forty-mile radius of London. Generally associated with *H. stigma* and somewhat resembling it in colour, but the unmarked wings will at once separate the present species. The earliest notes I have of the capture of *H. nitidulus* are in April; from then onwards it is to be taken until late autumn. There are several broods in a year, but apparently it does not continue throughout the winter as does *H. stigma*.

Eggs are laid, as a rule, under the scaly ensheathing base of a pair of pine needles, singly, but occasionally in pairs. Sometimes they may be found laid on the needles near the tips, as in *H. stigma*, or less often on twigs. The egg is from ·65 to ·7 mm. long, of long oval shape, with pitted chorion and micropylar knob. Colour is at first yellowish-white, later darkening to orange-brown. Hatching takes place in six days (70° F.) or nine days (60° F.). The young larva is wholly pale yellow, after feeding, becoming somewhat brownish.

In the second instar the body colour is yellowish-white with brownish longitudinal lines latero-dorsally. The head markings are the same as in the third instar.

Description of Third-instar Larva. (Plate XL, fig. 3.)

Length when full fed about 7 mm. Body white, with pale brown latero-dorsal longitudinal lines.

The head is pale yellow in colour, with a pale brown, central wedge-shaped mark, expanding anteriorly. Sides of head pale brown. Eyes black; antennae smoky, the basal joint much darker

and almost black. Jaws castaneous. Palpi pale brown, terminal joint smoky.

The body markings are really quite characteristic, though frequently obscured by the colour of internal organs. Larvae bred in captivity are always typical, it is only wild larvae which occasionally lack markings.

The body is white, or creamy-white in colour, with two pale chestnut-coloured longitudinal bands on either side of the white central area. This white, central, longitudinal area is remarkably even throughout its entire length and the inner margins of the latero-dorsal longitudinal bands are almost parallel to each other. The sides of the body are white.

Contrasting this with the larva of *H. stigma*, which, also occurring on pine is most likely to be confused with the present species, it should be noted that in *stigma* the colour of the latero-dorsal bands has always more crimson in its composition, and is, in consequence, chocolate-coloured, not castaneous. Also, the latero-dorsal bands are really composed of separate, somewhat triangular marks on each segment, and though they tend to become confluent, they are not so continuous and even as in *nitidulus*. The white central area in *stigma* is consequently less regular and parallel sided.

Returning to *H. nitidulus*, the prothorax is whitish, the latero-dorsal longitudinal bands start immediately behind the head. In these bands are embedded two crescentic, almost colourless sclerites, each margined with brown. Between the two main sclerites is a smaller rounded sclerite, usually blackish in colour, lying in the median white area. From this the pulsating dorsal vessel can be traced back. Meso- and metathorax have similar markings to the prothorax and possess a pair of small rounded sclerites each, besides other chitinous thickenings in the transverse folds.

In the abdomen the brown latero-dorsal bands and white median area continue, together with the dark line of the dorsal vessel. Below, the abdomen is brownish-white and laterally, more especially in the hind abdomen, is a narrow brown line on each side. Legs are whitish translucent.

For pupation, an elliptical, loosely woven cocoon is spun, through which the larva is distinctly visible. The

cocoon consists, as in all species of *Hemerobius*, of a central main cocoon, 4-5 mm. long, of elongate-oval shape, surrounded by a more or less well-defined outer envelope. This outer envelope is frequently represented by little more than floss silk. After a week or two the pupa is disclosed and the emergence of the imago normally follows in from ten to fourteen days in summer. The pupa is not remarkable; at first pale brown in colour, it later darkens just before emergence. Winter is passed as a brown pupa which does not emerge until the following spring. There are several broods in the year.

Eggs laid.	Hatched.	Av. Temp.	1st moult.	2nd moult.	Cocoon.	Av. Temp.	Pupated.	Emerged	Av. Temp.
28/5/22	2/6/22	67° F.	8/6/22	16/6/22	27/6/22	65° F.	12/7/22	29/7/22	63° F.
29/5/22	3/6/22	67° F.	9/6/22	14/6/22	27/6/22	65° F.	12/7/22	28/7/22	63° F.
26/8/20	5/9/20	61° F.	9/9/20	13/9/20	22/9/20	63° F.	3/10/20	27/4/21	wintered

Larvae have been found feeding on *Lachnus pini* L., *L. tomentosus* De G., and *Eulachnus agilus* Kalt. Doubtless no small insects would come amiss as food.

Hemerobius micans Olivier.

Wing expanse 12-16 mm. Colour yellow. Wings yellowish, hyaline. The fore-wing venation is spotted with blackish, but these spots are more widely spaced apart and larger than in *nitidulus*. They also continue as short streaks on the membrane. The bases of the macrotrichia are not the centres of the spottings, and are mainly yellow. No distinct black spot in basal third of fore-wings. Three radial sectors.

This species is not likely to be confused with any other British form on the above characters, its yellow colour and almost uniformly coloured wings without cloudings or conspicuous marks of any kind being very typical. The spotting of the wings is quite distinctly different from that of *nitidulus*, and, moreover, it is decidedly rare to find *micans* on conifers, which *nitidulus* frequents. Deciduous woods are its favourite haunts, especially on beeches, hornbeam, hazel and oak, as far as I have seen. The time of first appearance is early April, when imagines may often be taken on the wing before the buds of the beeches have

commenced bursting. From then it continues until October.

Eggs are laid singly, on the brown, dry bud scales, and on the undersides of leaves alongside the veins, etc. It is not common to find as many as three or four eggs together. The length of the egg is ·7 mm. and colour yellowish-white. In shape quite typical of *Hemerobius*, long oval, with white micropylar knob and pitted chorion. Colour becomes yellow, and the egg hatches in eight to eleven days at 63° F.

The larva is pale yellowish in colour, slightly brownish at the posterior extremity. The head bears no markings.

In the second instar there are often indications of latero-dorsal longitudinal brown lines. The head is immaculate, somewhat smoky at the sides.

Description of Third-instar Larva. (Plate XL, fig. 2.)

Length when full grown about 7 mm. Head hardly marked. Body colour white, or more frequently yellow, with more or less well-defined brown latero-dorsal lines, often lacking.

The head differs from that of most Hemerobiids in being almost free from darker markings. It is yellowish-white in colour, slightly blackish at the sides. There may be a faint indication of a central wedge-shaped mark, but this is not usually very noticeable. Eyes black; antennae decidedly blackish, except basal joint which is paler. Jaws and palpi greyish.

Prothorax with two brown latero-dorsal bands, in which are situated a pair of elongate, pale-coloured sclerites. In the meso- and metathorax the latero-dorsal bands continue, and there is a pair of small sunken sclerites per segment, joined transversely by a blackish furrow.

The abdomen is generally pale in colour, but latero-dorsal bands may run the length of the body, fading, however, towards the posterior extremity. There are one or two transverse dark furrows per segment. A dark median line runs from the posterior third of the prothorax almost to the extremity of the abdomen. Underside of body uniformly yellowish. Legs translucent whitish.

This description is taken from a fully-marked specimen. It is very common, however, to find larvae almost devoid of markings, and, indeed, the commonest form on beech is briefly as follows.

Head immaculate, pale yellow, slightly blackish at the sides. Antennae decidedly blackish, basal joint pale. Jaws and palpi

slightly greyish. Body primrose yellow, the posterior extremity rather more orange in colour. In the prothorax only are there indications of latero-dorsal bands, these being pale castaneous. Rest of body uniformly pale, except for a median longitudinal darker line and one or two transverse sunken lines per segment.

A small, loosely woven cocoon, 4-5 mm. long × 2 mm. broad, is spun in a curled leaf, in a crevice, or in moss at the foot of the tree. The majority of cocoons found in winter have been in the last situation, often as deep as one inch below the surface. The pupa is lemon-yellow in colour. As emergence approaches, the dorsum becomes edged with brown. Winter is passed as a pale yellow pupa, which remains pale in colour throughout the whole of the cold weather. In early spring darkening takes place, and the imago appears shortly afterwards.

Eggs laid.	Hatched.	Av. Temp.	1st moult.	2nd moult.	Cocoon.	Pupated.	Av. Temp.	Emerged	Temp. on emerging.
20/8/20	31/8/20	61° F.	7/9/20	11/9/20	13/9/20	28/9/20	62° F.	1/4/21	54° F.
23/8/20	31/8/20	61° F.	74/9/20	8/9/20	14/9/20	25/9/20	62° F.	5/4/21	53° F.

The two examples given are from eggs of one female. I have no complete records of from egg to imago emerging the same year, but many bred from captured larvae. The length of the pupal stage is ten days (65° F.) to two weeks (60° F.) In one case a larva spinning on the 17th July, 1921, emerged on the 14th October, 1921. The average temperature here was over 70° F. during July, more than 65° F. throughout August, and about 65° F. for the remaining period. Such variants are very puzzling.

The food of *H. micans* as a larva is varied, all small insects and mites being accepted. On beech, larvae have been observed feeding upon *Phyllaphis fagi* L., which, of course, is a wax-secreting form. Often this aphid must be the principal food. Hymenopterous parasites have been bred from wild caught larvae. In one case (1921) 25 per cent. were parasitised.

Hemerobius humuli Linnæus.

Wing expanse 14-16 mm. Colour yellow with some fuscous. Antennae annulated with fuscous. Fore-wings pale yellow, venation spotted with black, the spots being continued on the membrane

as pale sagittate markings. In the basal third of fore-wing, a distinct black spot at the cross-vein connecting $M_{3\,1\text{-}4}$ and Cu_1 where the two latter closely approach one another.

This species is likely to be confused with the next. The male genitalia are very distinct, and there is no difficulty in separating males, but with females determination is often less easy. Generally the wings of *humuli* appear more peppered with black and the membrane less clouded with grey, than is the case with *lutescens*, but this is not always so.

H. humuli occurs abundantly in deciduous woods from May until October, frequently in company with *H. lutescens*. Hazel appears to be a favourite tree.

Eggs are generally laid singly, rather indiscriminately on leaves. A preference is shown for the vein groves on the upper surface of a leaf, also many eggs are laid on the under surface alongside projecting veins. Both in captivity and in nature, however, it is common to find them anywhere on upper- or under-side of the leaf, sometimes on the petiole. The egg is ·7 mm. long, yellowish-white in colour, of typical elongate-oval shape with pitted chorion and micropylar knob. Very little darkening is noticeable as hatching approaches, but the embryonal eyes can be seen through the eggshell two or three days before the larva escapes, and also the latero-dorsal lines are visible as a double row of dots.

At first the larva is white with a row of pale brown spots on each side of the dorsum, but next day it has become more yellow, especially in the abdominal region. In the second instar the head bears the characteristic markings, and the body is also very like that of the later larva, but lacks some brilliancy.

Description of Third-instar Larva. (Plate XL, fig. 4.)

Length about 7 mm., when full fed. Body colour white or creamy-white with two interrupted, brown, latero-dorsal bands.

Head translucent whitish; markings brown, consist of a central mark running from base of head forwards, but ending after having traversed one-half or two-thirds the length of the head. Sides of head, as far forward as the eyes, brown. The markings on each side really consist of two brown lines, but these tend to diffuse into one another. Eyes dark brown, antennae and palpi slightly fuscous, as also jaws, which are more castaneous at their apices.

Body white with two latero-dorsal, longitudinal, brown bands interrupted inter-segmentally. These latero-dorsal bands commence at once in the prothorax. Prothoracic sclerites pale in colour or blackish, crescent-shaped, imbedded in the brown, latero-dorsal lines. Between them the median dorsal dark line terminates. Meso- and metathorax each with a pair of brown, somewhat triangular blotches, forming part of the latero-dorsal bands. The sclerites of these two segments are shortly crescentic, but the crescents turn inwards instead of, as in the prothorax, outwards.

In the abdomen the latero-dorsal brown bands continue as triangular spots on each segment. Posteriorly these spots run into one another, tending to form continuous bands. The middle area between the two bands is white, with a bluish tinge anteriorly. The median dorsal line is blackish anteriorly and more brown in the last few abdominal segments, depending, of course, for its colour, purely on the gut contents. Laterally the abdomen is white, sometimes with a trace of a lateral, sunken, blackish line, but this is more noticeable in meso- and metathorax. Underside of body greyish-white, often mottled with brown.

The larva of *H. humuli* is very similar to that of *H. lutescens* and it is frequently almost impossible to distinguish between the two. It can only be said that most *humuli* larvae are more brilliant in coloration, as a rule. The central mark of the head does not usually continue so far forward as it does in *lutescens*.

For pupation a loose cocoon of white silk, 4·5 mm. long, is spun among dead leaves or moss, etc. The pupa is yellow in colour, with eyes dark brown. Later it becomes brown on the sides of the dorsum. Wings also darken just before emergence, which occurs in from one to two weeks after pupation, in summer. Winter is passed as a pale yellow larva, curled up within the cocoon and pupating in March or April, prior to the appearance of the imago.

Eggs laid.	Hatched.	Av. Temp.	1st moult.	2nd moult.	Cocoon.	Av. Temp.	Pupated.	Emerged	Av. Temp.
30/5/21	7/6/21	63° F.	9/6/21	11/6/21	18/6/21	65° F.	24/6/21	5/7/21	65° F.
2/6/21	10/6/21	63° F.	12/6/21	15/6/21	20/6/21	65° F.	25/6/21	5/7/21	66° F.
29/8/21	6/9/21	65° F	9/9/21	13/9/21	19/9/21	66° F.	24/3/22	17/4/22	wintered

The first two examples in the table are from eggs of one female, and give a very average summer life-cycle. The

third gives the time taken by a larva which passed the winter. There are several broods in the year, one following immediately upon the other. The food of *H. humuli* larvae on hazel has been seen to be *Myzocallis coryli* Gtze. and *Macrosiphum avellanae* Schr., besides Psyllid nymphs. As, however, the larva in captivity is not at all fastidious, the exact species of aphid matters little.

Hemerobius lutescens Fabricius.

Wing expanse 14–16 mm. Colour pale yellow marked with fuscous. Antennae yellowish, hardly annulated. Fore-wings with a distinct black spot in basal third, between M_{3+4} and Cu_1. Venation pale, more or less spotted with blackish. The inner (dorsal) margin of the fore-wing is clouded with brown or greyish, extending into the membrane. The wing is also clouded in the region of the gradate veinlets.

It is often difficult in the case of females to distinguish this species from *humuli*. The fore-wings are, however, less distinctly spotted and more clouded with greyish than in *humuli*, as a rule.

H. lutescens is common from April until October in deciduous woods. It appears to be more common than *humuli* on beeches.

Eggs are laid singly in the curled dead margins of leaves, and on the upper or lower faces of living leaves, in the vicinity of aphids. There is no difference observable from the eggs of *H. humuli*. As hatching approaches, signs of the embryo within are visible. The larva escapes and commences feeding almost immediately on unhatched eggs or aphids. It is at first about 1 mm. long and pale yellow in colour.

In the second instar, the head and body markings are more easily visible and are the same as in the later larva.

To give a description of the third-instar larva would be to repeat, to a great extent, that of *H. humuli*, since *lutescens* is very similar. The following trivial differences are noticeable in a typical larva of *lutescens*. The central mark of the head extends almost to the anterior margin, and much farther forward than is the case in *humuli*. The body coloration is less brilliant as a rule, and the white parts more often have a yellowish or brownish tinge. Nevertheless, it is commonly quite impossible to distin-

guish between larvae of *humuli* and *lutescens*. No constant specific characters have been found.

The pupal stage lasts one or two weeks, in summer. Winter is passed as a larva within the cocoon. One record has been obtained of a specimen attempting to hibernate as a pupa, but it did not survive the winter. There is a succession of broods in the year.

Eggs laid.	Hatched.	Av. Temp.	1st moult.	2nd moult.	Cocoon.	Av. Temp.	Pupated.	Emerged	Av. Temp.
12/9/20	23/9/20	61° F.	28/9/20	4/10/20	8/10/20	63° F.	19/3/21	12/4/21	53° F.
13/9/20	25/9/20	61° F.	1/10/20	6/10/20	13/10/20	63° F.	19/3/21	13/4/21	53° F.
14/9/20	26/9/20	60° F.	1/10/20	6/10/20	11/10/20	63° F.	died	—	—
14/9/20	26/9/20	60° F.	1/10/20	7/10/20	16/10/20	62° F.	20/3/21	14/4/21	53° F.
15/9/20	27/9/20	60° F.	1/10/20	5/10/20	9/10/20	63° F.	19/3/21	12/4/21	53° F.
16/9/20	27/9/20	61° F.	30/9/20	7/10/20	10/10/20	63° F.	died	—	—

All the above examples were from the eggs of one female, and show the amount of variation in time, which often occurs, even when, as far as possible, all are under the same conditions. The temperature was almost the same in each case, and food was supplied in excess of daily requirements. Larvae of *H. lutescens* will accept any aphids as food. On beech, *Phyllaphis fagi* L., together with various stages of Psocids, etc., form their principal diet, but other trees with other aphids are equally suitable.

Hemerobius stigma Stephens.

Wing expanse 14–16 mm. Colour reddish- or blackish-brown. Venation of fore-wings dotted with dark fuscous. Black spot in basal third of fore-wings, so characteristic of *humuli* and *lutescens*, is here less marked. Membrane clouded with blackish, especially about gradate veinlets.

This species is very common on conifers, throughout the whole year, except in very cold weather. In winter only dark greyish forms are met with; in summer a reddish-brown colour is more usual. Apparently deciduous trees are never visited, although the larvae will, in captivity, eat any species of aphis, and the majority bred have been reared on *Aphis rumicis* L.

The life-history has already received attention elsewhere (13). Eggs are laid mainly in two positions; either a quarter of an inch from the tip of a pine needle on its inner flat face, or under the scaly wrapping at the base of a pair of needles. They are laid singly, sometimes two or three together. In form the egg is quite typical of *Hemerobius*, oval, ·7 mm. long × ·3 mm. broad, with a small micropylar knob and pitted chorion. At first the colour is yellowish-white, but later becomes brownish, and signs of the developing embryo are visible from outside. Hatching takes place in nine days at 60° F., or twenty-seven to thirty-six days at 45° F., in winter.

The young larva is at first brownish-white in colour, but next day dark markings on the head are visible. In the second instar, the markings on the head and body are the same as in the third instar, sometimes a little less definite.

Description of Third-instar Larva. (Plate XL, fig. 5.)

Length when full fed about 7 mm. Colour creamy- to brownish-white, with two latero-dorsal chocolate-coloured bands running the length of the body. These vary in intensity.

Head greyish-white, translucent. In the middle line is a wedge-shaped, brown central mark, running from behind forward to the anterior margin, where it is widest. Laterally the head is brown. Eyes dark brown or black; antennae and palpi blackish. Jaws greyish, becoming more brown at their apices.

Body creamy-white sometimes tinged with brown or pink; in winter, greyish. In the prothorax, just behind the head, the latero-dorsal bands commence and run the length of the body. On all the segments, except prothorax, these bands are formed by somewhat triangular dark-brown spots, which often become confluent. In the prothorax the bands are narrower, and imbedded in them are a pair of crescentic, greyish sclerites. Meso- and metathorax have each, as usual, a pair of smaller sclerites.

In the abdomen, the latero-dorsal bands continue, tapering to the extremity. On each side of the body is a brown line, more or less distinct. Ventrally the colour is uniformly greyish- or brownish-white. Legs smoky-white, with darker knees and tarsi.

It will be seen from the description that there is very little difference between this larva and that of other species of *Hemerobius*. Since, however, *H. stigma* only occurs on

conifers, one need not expect to find these larvae associated with *H. humuli* and *lutescens*. The larva of *H. nitidulus* is most likely to be confused with *stigma*, since it also occurs on pines. Most probably larvae of *H. orotypus*, *limbatellsu pini*, and *atrifrons* are all similar to *stigma*.

The larvae are very active, but, when at rest, often stretch themselves out along a pine needle, with the head towards the base.

For pupation, a loose cocoon of white silk is spun between two or three needles, or in a crevice of the tree bark, and in about a week the pupa is disclosed. The pupal stage is short in summer, but may last through the whole winter, since in this stage the insect hibernates when the weather is too severe for active life. At first the colour of the pupa is yellow, with the eyes black and sides of the dorsum brown. Later, in from one and a half to three weeks, it becomes uniformly dark brown, and now the imago can emerge almost immediately, during any warm spell. If cold weather persists, the entire winter may be passed in this state of readiness.

Eggs laid.	Hatched.	Av. Temp.	1st moult.	2nd moult.	Cocoon.	Pupated.	Av. Temp.	Emerged	Emerg. Temp.
24/8/20	2/9/20	61° F.	6/9/20	9/9/20	15/9/20	24/9/20	62° F.	25/2/21	48° F.
24/8/20	2/9/20	61° F.	6/9/20	9/9/20	15/9/20	24/9/20	62° F.	28/2/21	45° F.
25/8/20	4/9/20	61° F.	8/9/20	11/9/20	17/9/20	27/9/20	62° F.	25/2/21	48° F.
26/8/20	5/9/20	62° F.	9/9/20	13/9/20	22/9/20	3/10/20	62° F.	30/2/21	45° F.
1/2/21	9/3/21	45° F.	12/3/21	21/3/21	9/4/21	24/4/21	51° F.	12/5/21	54° F.
2/2/21	10/3/21	46° F.	14/3/21	20/3/21	9/4/21	24/4/21	51° F.	13/5/21	54° F.

The first four cases above give times taken by larvae which wintered as pupae. The two last give a winter life-cycle with a very long period of incubation. While the development of the pupa is arrested, in some cases as early as September, and emergence does not take place until the following year, it is clear that this is not always so, since in December both larvae and imagines have been taken. The winter larvae are generally quite dark grey in colour, and show very few markings on the body.

Boriomyia subnebulosa Stephens.

Wing expanse 14–18 mm. Prevailing colour dark grey or fuscous. Fore-wings with three sectors to the radius; Cu_1 is strongly mottled

with dark fuscous about the middle of its length. This appearance is very characteristic, but *nervosa* is similarly marked. In *nervosa* the wings usually appear more variegated than is the case with *subnebulosa*. Hind-wings unmarked, uniformly paler. The male genitalia are very distinct.

As a rule, one of the most abundant of all the Hemerobiidae, even in the Metropolis, frequently being attracted to lights.

It occurs from early February until November. One specimen was taken, newly emerged, in January 1921. All kinds of plants are frequented, from small herbs to trees.

Eggs are about ·7 mm. long, of quite general Hemerobiid form, oval, with a small white micropylar knob and pitted chorion. They are usually laid singly, on leaves near projecting veins, or at the leaf margin. Sometimes on the petiole and along the stipular bases of rose leaves, inside, a row of six or seven eggs may be found. The colour of the egg is at first white, later darkening to brownish. In from six (70° F.) to ten or eleven days (60° F.) hatching takes place.

The newly-hatched larva is brownish-white in colour, without any distinct markings. The head is blackish. The second and third instars are very similar, except, of course, in size.

Description of Third-instar Larva. (Plate XL, fig. 6.)

Length about 7 mm. as a rule, but sometimes as much as 9 mm. Colour uniformly dusky, head blackish, body dove-grey to brown. In the early part of each instar it is much darker than later.

Head uniformly dark, a central wedge-shaped portion may be delimitated by a lighter line running on each side of it. Also there is sometimes a lighter line above each eye and another at the same level as the eye. Eyes black. Antennae and palpi blackish. Jaws lighter, but becoming darker at the tips.

Body uniformly brownish-grey. There are sometimes indications of a pair of darker latero-dorsal lines, but as a rule these are hardly visible, except on the prothorax. There are two semi-lunar, shining blackish sclerites on the prothorax, and smaller, more rounded ones on meso- and metathorax. The abdomen has, as usual, traces of similar sclerites. Legs are blackish, darker at the joints, and extremities of the tarsi. Below, the body is uniformly brownish-

grey. A faint darker lateral line may be present. It should be noted that while a newly-moulted larva may be very dark in colour, a full-fed one is often of pale dove-grey.

As will be seen, this larva is very distinct from all those previously mentioned, and can easily be identified. However, *nervosa* has probably a similar larva.

For pupation an elongate, loosely woven cocoon of white silk is spun. One noticed was 6·5 mm. long × 2·5 mm. broad, but this is rather large. In summer the larva pupates and emerges in two or three weeks after spinning, but later in the year it remains curled up within the cocoon and winters as a larva. A warm spell occasions the change to pupa, and the imago follows in due course. Once the pupa is disclosed, the imago appears in a few weeks. Thus, one pupated 25/2/21 and emerged 31/3/21 = 34 days at an average temperature 50° F., a second pupated 20/3/21 and emerged 12/4/21 = 23 days at an average temperature 52° F., and a third pupated 4/3/21 and emerged 4/4/21 = 31 days at an average temperature 52° F.

Eggs laid.	Hatched.	Av. Temp.	1st moult.	2nd moult.	Cocoon.	Pupated.	Emerged	Av. Temp.
10/7/20	16/7/20	66° F.	19/7/20	21/7/20	29/7/20	5/8/20	16/8/20	67° F.
17/7/20	23/7/20	68° F.	28/7/20	1/8/20	5/8/20	10/8/20	24/8/20	64° F.
13/5/21	23/5/21	63° F.	26/5/21	29/5/21	2/6/21	8/6/21	18/6/21	64° F.

Little need be said of the habits of the larva except that it is very voracious, and will take any species of aphid. Commonly it may be found on beans preying upon the black *Aphis rumicis* L. Others have been found feeding upon coccids, *Pulvinaria betulae* L., on vine, etc. All stages of Aleurodids and Psyllids, besides various mites, are taken as food.

Boriomyia nervosa Fabricius.

Wing expanse 14–18 mm. Very like *B. subnebulosa*, but as a rule of a more variegated appearance. Males are easily determined by the genitalia, but females are frequently indistinguishable from *subnebulosa*. A venational difference was indicated by Brauer (3), but this is not constant.

One larva has been seen, taken by sweeping among nettles. It was considered at the time to be *subnebulosa*,

and the description made was inadequate. A slight difference in the head markings was noticed, but until further material has been examined it would be useless to describe these. The pupa and cocoon were similar to *subnebulosa*.

Boriomyia concinna Stephens.*

Wing expanse 18–23 mm. Colour ochreous-brown. Fore-wings marked with dark fuscous, the veins regularly dotted with blackish. As a rule, four radial sectors. Female with a conspicuous upturned ovipositor.

This species and *B. quadrifasciata* are the largest of our British Hemerobiids, and of very distinct appearance. Both are pine-frequenting forms; *concinna* is abundant near London, *quadrifasciata* usually less so. The large excess of females is most noticeable later in the season, especially after June, when a male is often a rarity. On the 8th July, 1922, some thirty or forty *concinna* were taken, in the hopes of obtaining a male, but not one was seen. This probably accounts for the large proportion of infertile eggs laid by wild caught females. Imagines of *B. concinna* may be taken from early May until August, always on conifers, in my experience.

The life-history is still somewhat of an enigma to me. Larvae first appear in April, and may be taken, full fed, in numbers during May. These then spin up and emerge in May and June. Males die off and females persist throughout July. The eggs which I believe to be fertile, darken but do not hatch in summer. Sterile eggs remain white and then shrivel in a few weeks.

Eggs are laid singly, inserted into crevices, and well hidden from view, the ovipositor being used to full advantage. A favourite position is under the scaly wrapping of the needle bases. The egg (Plate XL, fig. 13) is exactly 1 mm. long, of elongate oval shape, slightly broader at the pole opposite to the micropyle. The chorion is not pitted, but is covered with minute, glassy papillae, giving the egg

* Structural differences in both *concinna* and *quadrifasciata*, seen even in the egg, appear to indicate that *concinna* is distinct generically from the "*subnebulosa* group," which latter is far more closely allied to *Hemerobius*, but after examination of some exotic species, including a few Nearctic forms kindly sent me by Dr. N. Banks, the "*concinna* genus" appears less well defined and more difficult of diagnosis. Rather than complicate matters I therefore leave the genus *Boriomyia* as an unnatural grouping.

a frosted appearance. These projections always remain colourless. The micropylar knob is large, smooth and chalky white. Relatively it is three or four times the diameter of the same structure on the egg of *Hemerobius*. At first the egg is yellowish-white in colour, but begins to darken in a few days, and after about a week it is dark brown, especially so at the micropylar pole. The micropylar knob remains conspicuously white. Sterile eggs do not darken at all, but become gradually shrunken. Last year I kept the eggs which had darkened, for some months, then, considering them lifeless, put them in spirit. This year again the same thing has happened with a large number of eggs from wild caught females. The eyes of the embryo are not visible, but I am convinced that these must be fertile and shall await events.

Young larvae I have not seen. The second and third instars are similar.

Description of Third-instar Larva. (Plate XL, fig. 7.)

Length when full fed about 9 mm. Body-colour opaque creamy-white, with interrupted, broad, chocolate-coloured, latero-dorsal bands.

Head whitish with fuscous markings. These markings are characteristic. The general plan is as in larvae of *Hemerobius*, *i. e.* there is a central wedge-shaped brown mark, fading at the anterior margin. Laterally the head is brown, with a lighter line at the same level as the eye on each side. Between central and lateral marks are two smaller marks, one running towards the base of each antenna, but fading before reaching it. These two marks are distinct for *concinna*, though anteriorly they may tend to merge into the lateral marks, near the eyes. Eyes black; antennae blackish; palpi also blackish, but more especially the last joint of same. The jaws are dark fuscous, with the apical fifth distinctly castaneous.

Body creamy-white, with two rows of chocolate-coloured blotches latero-dorsally. These blotches are broadest anteriorly on each segment and pass well down the sides. Posteriorly they narrow and are interrupted from one another. The prothorax has a pair of latero-dorsal brown lines extending throughout the first two divisions of that segment. The posterior division, which bears the spiracles, is immaculate and wholly white. Imbedded in the latero-dorsal bands is a pair of semi-lunar blackish sclerites. The latero-dorsal bands of meso- and metathorax are similar to those of the abdominal segments. They are composed of one pair of chocolate-coloured

blotches per segment, each blotch is anteriorly broad, extending down the sides, posteriorly narrowing and interrupted from the corresponding blotch of the next segment. The sclerites of meso- and metathorax are small, rounded and blackish. The abdomen is similarly marked to the meso- and metathorax, but has, in addition, a lateral brown, sunken line below the spiracles. Anteriorly in each segment the latero-dorsal blotch extends down to this line. There is also a dark median dorsal line running the greater part of the length of the body. Ventrally the colour is brownish-white. The legs are dark fuscous.

There should be no difficulty in identifying a larva of *B. concinna* since, although variable, both head and body markings are peculiar to this species (? also to *quadrifasciata*).

For pupation a very coarsely reticulate, distinctly yellowish cocoon, about 6 mm. long, is spun between pine needles, or in crevices of the bark. The cocoon is quite different from that of any other of our British Hemerobiids, being coarse and stiff to the touch. Five or six days after spinning (65°–70° F.), the pupa is disclosed. This is brown in colour, the back yellow, with transverse brown bands. Wings and body darken, and emergence takes place in from eleven (70° F.) to fourteen (63° F.) days. Such is the case in May and June.

The imagines are carnivorous, and in captivity will sometimes devour one another if other food is lacking. In no case has a pairing been obtained in cages, the final result after some days often being the destruction of the male by the female. The larvae feed on aphids, etc., on pines, but will always accept other aphids in the place of their natural food.

Boriomyia quadrifasciata Reuter.

Wing expanse 18–23 mm. Very like *concinna* in venation and general facies, but the colour is grey as against the ochreous-brown of *concinna*. The fore-wings are more peppered with blackish, and there are four more or less distinct dark fuscous, transverse fasciae.

Once thought to be a variety of *concinna*, this form occurs together with the latter on conifers, but is generally not so abundant in the south of England. In appearance the majority of *quadrifasciata* are totally different from

concinna, but I have three specimens of the last which are intermediate to *quadrifasciata*. The only way to settle the question of specific rank is by breeding from the egg, and this I have failed to do, as no eggs have been obtained from the several females captured.

The time of appearance of this species is the same as for *concinna*.

In May 1921, under bark, a cocoon with pupa enclosed was found, which did not differ materially from that of *concinna*. The imago appeared a day or two after and proved to be *quadrifasciata*. I fear that at present I can give no further facts in regard to the life-history.

Micromus paganus Linnaeus.

Wing expanse 14–20 mm. General colour greyish or pale testaceous. Wings sub-hyaline, pale, with two fuscous lines on each fore-wing following the gradate veinlets, intersected by two or three longitudinal ones running into outer and inner margins. The humeral cross-vein is not recurrent; radius with about five sectors.

Considered by MacLachlan (9) as a common species, I have only taken it singly, in gardens, and until this year had been unable to obtain eggs. Mr. W. E. China, who has captured it freely this year at Oxshott, very kindly came to my assistance and supplied me with several living females, from which fertile eggs were duly obtained; a very welcome addition to these notes. The Oxshott specimens were taken by sweeping herbage, in May and June. Apparently few survive until July.

Eggs (Plate XL, fig. 14) are laid singly, attached by their sides, or, in four cases, by their anti-micropylar poles. They are nearly 1 mm. long, of elongate-oval shape, and creamy-white in colour. The chorion is smooth and *not* pitted, except around the micropyle, which area, by reason of much fine pitting, appears whiter. The micropylar apparatus is reduced to a small, disc-like, white knob. Taking it as a whole, the egg bears some resemblance to that of a Chrysopid, except, of course, for the fact that a stalk is absent. Hatching takes place in twelve days, with an average temperature of 70° F. Previously to this the egg becomes brownish-white, and, as usual, the eyes are visible through the eggshell.

The first-instar larva is about 1·4 mm. long, pale brown-

ish in colour, with faint indications of a pair of latero-dorsal lines. The head markings are practically the same as in the full-grown larva. In the second instar the body markings are more distinct, but their full depth of colour is reached in the third instar.

Description of Third-Instar Larva. (Plate XL, fig. 8.)

Length from 8–9 mm. Body elongated, smooth. General colour varies from creamy-white to orange or pale reddish-brown, with two, rather indistinct, latero-dorsal lines, madder brown.

The head is shorter and broader than that of *Hemerobius*, the greatest breadth being between the eyes. The upper surface is greyish or light fuscous, with a darker central portion, not so sharply wedge-shaped as in *Hemerobius*, but somewhat rounded behind. This is separated from the dark shaded sides by a lighter, Y-shaped sunken line (frontal suture). At the level of the eye, laterally, the head is lighter, and the lower surface is greyish-white. Eyes black. Antennae long, with palpi and jaws, blackish. The jaws become darker distally, but for the last eighth are castaneous.

The body is very elongate. It often has a decidedly reddish tinge and is not conspicuously marked, except in examples with a lighter ground-colour. In one pinkish-white specimen the latero-dorsal brown bands are far more noticeable than is usual. The thorax is of the same rosy hue as the rest of the body, except that the slight lateral prominences of meso- and metathorax are often more creamy-white and conspicuous. In the prothorax there is a pair of scarcely pigmented, semi-lunar sclerites, lying on the outer margins of the latero-dorsal bands. Meso- and metathorax have each a pair of smaller, more rounded, shiny sclerites. A pair of madder brown, ill-defined, latero-dorsal bands run the length of the body, and between them, commencing in the hind part of the prothorax, is a median blackish line. Laterally a pale brownish line follows the spiracles, but this is not always very clearly marked. Tip of abdomen blackish. Ventrally the body is uniformly reddish-white. Legs smoky-white, blackish at the joints and extremities of the tarsi.

The entire build of the larva is more slender than that of *Hemerobius*, the legs also appear longer. In some respects it is similar to a Chrysopid larva such as *C. flava*, especially in the outline of the head and thorax. The trumpet-shaped empodium, so characteristic of *Chrysopa* in all instars is, however, here present only in the first instar, as usual for Hemerobiids.

It is very common to see larvae, when at rest, with the abdomen stretched out and raised in the air almost to a right angle with the thorax. What may be the significance of such an attitude is difficult to imagine.

When full fed, a loose, oval cocoon of white silk, 5 mm. × 2 or 3 mm. is spun, and within this the larva lies, with head and end of abdomen bent ventrally. Thus the winter is about to be passed. Presumably pupation and emergence will not take place until spring, as is the case with most species of *Chrysopa* and some Hemerobiids.

Eggs laid.	Hatched.	Av. Temp.	1st moult.	2nd moult.	Cocoon.	Av. Temp.	Pupation and emergence.
14/6/22	26/6/22	62° F	30/6/22	4/7/22	11/7/22	62° F.	? in spring
14/6/22	26/6/22	62° F.	30/6/22	8/7/22	12/7/22	62° F.	,,
18/6/22	30/6/22	62° F.	5/7/22	9/7/22	19/7/22	62° F.	,,

The three examples given in table are typical of twelve larvae observed.

Family IV. CHRYSOPIDAE.

There are two British genera, *Chrysopa* and *Nothochrysa*. Of *Chrysopa* we have thirteen species, and of these I shall give details of ten. Of the three remaining, I have not yet seen larvae. There are two species of *Nothochrysa*, an account will be given of *N. capitata*.

Insects of medium size, green colour and golden or bronze-coloured eyes. Wings hyaline, densely reticulate. *Nothochrysa* is brown.

The eggs are raised on stalks (Plate XLII, figs. 6–8). About one hundred may be laid by a single female. Some authors say several hundred. They are of oval shape, generally greenish, with a smooth chorion and a flat, disc-like micropylar apparatus. The hatching larva has a characteristic egg-breaker.

Larvae (Plates XLI and XLII) are rather broader than those of Hemerobiidae and generally more hirsute. The head is broad. Eyes of six ocelli, blackish. Antennae fairly long, slender and three-jointed, the second and third joints hardly distinguishable, form together the slender tapering portion. The basal joint is short. It is quite possible that the antennae are really four-jointed, as the basal

prominence may be a true joint, and, indeed, often appears to be such, but since in the Hemerobiidae it has not been counted as a joint, the same system is followed here. Sucking jaws caliper-like, longer and more slender than those of *Hemerobius*, formed quite typically of combined mandibles and maxillae. Labium small, with a pair of slender, four-jointed palpi which often appear to be still further subdivided.

Body almost smooth with only small hairs (*C. flava*), or very hirsute and tuberculate, with bristle tufts. The long setae of these latter may be serrate or hooked. Debris-carrying forms have the abdomen covered above with small hooked setae and the first instars of nearly all tuberculate forms have, at this stage, all the body bristles more or less hooked and carry some debris. Besides the above-mentioned setae, the whole surface of the body is covered with microtrichia. To each segment of the thorax there is at least one pair of dorsal sclerites, those of the prothorax being the largest. Generally there is also a median sclerite in the prothorax. The legs are well developed, but the articulation of tibia and tarsus is, as in Hemerobiidae, not very free. There are two simple tarsal claws and a trumpet-shaped empodium throughout life. This is used as an organ of adhaesion, but is apparently also tactile, frequently not being applied to the surface on which the larva is walking. The abdomen tapers to the extremity and is soft, though often with dorsal and lateral tubercles. From the 5th abdominal segment to the last, sclerites may appear again, increasing in relative size to the extremity. The anal papilla is adhaesive and used as an additional leg. The two eversible pads are not greatly developed. The larva is active and predacious.

A closely woven, parchment-like, short oval cocoon of white silk is spun for pupation. The pupa is at first yellowish, or palely the colour of the larva, later it becomes green and assumes the imaginal markings. The head is furnished with strong pupal mandibles. Wings lie at the sides, and closely applied to these the antennae are curled. The legs are held ventrally. When due to emerge, the pupa cuts a circular lid in the wall of the cocoon, and pushing this open, escapes. The cocoon, owing to the method of spinning, easily splits along lines parallel to its equator, and therefore probably very little actual cutting is necessary, to make this lid. Now the pupa crawls to a

suitable support, often some feet up, and the imago is disclosed. After shedding the pupal skin, the wings are fully expanded in from ten to twenty minutes, and the insect is ready for flight in considerably less than an hour after leaving the cocoon. Emergence takes place in morning or evening. If the temperature is less than 60° F., emergence is often delayed for some days, though the pupa is quite ready for emergence. A shiny black pellet of larval excrement is deposited soon after the insect is mature.

The imagines are largely crepuscular or nocturnal in habits. I have seen no spermatophore after pairing. A female may live two or three months, if fed upon aphids. Winter is passed generally as a larva within the cocoon, as a free larva in *C. prasina, ventralis* and *flavifrons*, and as an imago in *C. vulgaris*.

Internal anatomy :—That of the larva calls for no special comment. In the imago several points are of interest.

Stink glands lie on each side of the prothorax, opening just behind the head dorsally. These are green in life, but when killed or exposed to air they become decidedly bluish. The malodorous fluid secreted is pale yellow.

The salivary glands, passing back along the sides of the oesophagus to the hind part of the prothorax, are then recurrent, and just behind the head, branch into tufts of diverticula which intertwine with diverticula of the opposite side, over the dorsal part of the oesophagus. The simplest form of tuft is seen in *C. septempunctata* and *vulgaris* (Plate XXXIX, fig. 10). At the extremity of each salivary gland are two main branches, and each of these subdivides into three short diverticula. In *C. alba*, *tenella*, *prasina* and *ventralis* the glands are of the same pattern, but the diverticula are longer. In the remaining forms (Plate XXXIX, fig. 11) the diverticula are very long, and often branched,—*C. flava*, *flavifrons*, *perla*, and *N. capitata*.

The testes are always separate and each enveloped in a yellow scrotum. The general outline is elliptical, pointed somewhat at each end. The following modifications occur. *C. flava* (Plate XXXIX, fig. 12), testis elliptical, slightly pointed; vas efferens leaves from posterior end. *C. alba* and *perla* (Plate XXXIX, fig. 13), testis as in *flava*, but vas efferens leaves from anterior extremity. *N. capitata* (Plate XXXIX, fig. 14), testis elongate with one twisted lobe posteriorly; anterior vas efferens. *C. vulgaris*, testis

twisted in a dextral spiral of three to four turns; vas efferens anterior. *C. tenella*, as last, but spiral of four to five whorls. *C. flavifrons*, *prasina* and *ventralis* (Plate XXXIX, fig. 15), as in *vulgaris*, but of five to six whorls. It will be seen that a series taken from salivary gland, or testis characters, does not place together the apparently nearly related species.

Of the cement glands, in the female, only one is fully developed, the other, as usual, being rudimentary (Plate XXXIX, fig. 7, *cg*). Generally that of the right side is developed. In *C. vulgaris* this is a simple sac. In most other species of *Chrysopa* it is fringed with simple diverticula, as also in *Nothochrysa*, where it is very large (Plate XXXIX, fig. 8, *cg*). Again in *Nothochrysa* the two accessory glands running into the oviducts are exceptionally large, spindle-shaped, with a terminal flagellum-like diverticulum (Plate XXXIX, fig. 8, *ag*). These glands contain a viscous, colourless fluid.

Chrysopa flava Scopoli.

Wing expanse 34–48 mm.

This is one of our largest species of *Chrysopa*. One character separating it from *C. vittata*, with which latter it is often confused, is the emarginate costa in the fore-wings. About one-third of its length from the base, the costal margin of the wing gives a distinct dip. This is sometimes obscure, and one has then to take into consideration the fact that in *vittata* the basal joints of the antennae are longer than in *flava*, also the palpi of *vittata* are often more or less fuscous, whereas in *flava* they are green. When living, the colour of *flava* is yellowish-green, quite distinct from that of *vittata*, which is rather a full green. *C. flava* has the dorsal surface of thorax and abdomen broadly yellow. In both species the head is immaculate. Males of *flava* are easily separated by the incrassate costal veinlets, and genitalia.

Chrysopa flava is to be taken in deciduous woods and gardens in May and June. A few are still to be found in July. I have no definite evidence of a second brood, but having found eggs and imagines in late August I suspect the occasional existence of such.

The eggs are very characteristic (Plate XLII, fig. 6). In laying, the female attaches the footstalk of each egg very

close to that of the others, and the stalk, as drawn out, becomes attached to its neighbours. Thus a common stalk composed of several strands is formed, from the top of which the eggs radiate, brush-like. From three to forty eggs may be laid in one group. The only other species laying thus is *C. flavifrons*. Length of egg, ·9 mm; of stalk, 8–9 mm. Colour when first laid pearly greenish-white, becoming yellowish at the ends after a day or two, and then lighter each day until just before hatching the colour is wholly white, with the eyes of the embryo visible at the micropylar end as black dots. Hatching takes place about eight days after oviposition, the young larva being almost entirely white.

After resting a short time on the empty eggshell, the larva tests the neighbouring eggs and makes a meal of any of his less fortunate brethren as yet unhatched. This habit of the young larvae would seem to be a very serious objection to the method of egg-laying practised by *C. flava*, since often considerably more than half the brood is destroyed in this way. On the other hand, weaklings may be thus eliminated from the first.

In the second instar the larva is yellow with reddish or orange latero-dorsal longitudinal bands, as in the third instar. The head markings are even now quite typical.

Description of Third-instar Larva. (Plate XLI, fig. 1.)

Length 12–13 mm. Body devoid of setigerous warts or with same strongly reduced, so that the general appearance is less hairy than that of other Chrysopids and somewhat similar to that of a Hemerobiid larva. Colour pale yellow, with two latero-dorsal longitudinal brick-red bands, sharply marked off and darker on their outer margins, but internally diffusing into the central area.

Head whitish, markings red-brown. These consist of two parallel lines running from the posterior part of the head forwards. About the middle they diverge and become less distinct, often broken or dotted, but run towards the bases of the jaws. Laterally, there is a line running from behind forward to the eyes. Eyes black. Antennae and palpi greyish or pale castaneous. Jaws castaneous, darker at tips.

Thorax yellow at the sides and in the central area. A latero-dorsal orange or brick-red band runs longitudinally on each side of the back, and pigment of the same colour is diffused into the central area. This varies somewhat, so that sometimes the central area may be

yellow, and in other cases orange or reddish. On the prothorax are a pair of sunken, somewhat ovoid, black sclerites and between these another sclerite of the same colour. Meso- and metathorax have each one pair of small black sclerites.

The abdomen is yellow laterally, with the central area continuing from the thorax, orange. The red pigmentation is always most dense in the meso- and metathorax. Underside of body wholly pale yellow. Legs yellowish-white in colour, blackish at the knees and tarsi.

The larvae are very active and among the most voracious of our British species. The cocoon is rather larger than that of other species of *Chrysopa*, being on the average 5 mm. long. A more transparent equatorial band is often very evident.

The two following examples represent typical life-cycles.

Eggs laid.	Hatched.	Av. Temp.	1st moult.	2nd moult.	Cocoon.	Av. Temp.	Pupated.	Emerged	Av. Temp.
30/8/20	6/9/20	62° F.	11/9/20	18/9/20	29/9/20	62° F.	24/4/21	12/5/21	58° F
5/8/21	12/8/21	69° F.	17/8/21	22/8/21	2/9/21	67° F.	6/5/22	26/5/22	63° F

The insect hibernates as a larva within the cocoon. *Chrysopa flava* appears especially to favour oaks, where the larva has been seen feeding upon Jassids, once on a small beetle, and once on a spider. In captivity, larvae will accept any species of aphid except the woolly forms. It is therefore to be assumed that the natural food does not include such.

Chrysopa vulgaris Schneider.

Wing expanse 26–30 mm.

In spite of its specific name, this species is not one of the commonest in Britain, although at the time of MacLachlan's monograph it was apparently abundant. It is a small species with a yellow dorsal vitta running the entire length of the body, very like *C. tenella*. It can at once be separated from any other British species by the venational character given by MacLachlan (9). The head is unspotted, but the sides of genae and clypeus are suffused with deep orange colour.

Larvae and adults have been found in coniferous and

deciduous forests, also in gardens even on small plants. Imagines may be taken all the year round, since it is in the adult state that winter is passed. There are at least two broods each year.

Eggs are laid in May, June and July, and again in July and August constituting the second brood. The egg is very like that of *C. tenella*, and, except for the manner of laying, might be mistaken for that species. It is ·8–·9 mm. long, pale green in colour, and borne at the extremity of a short stalk 3–3·5 mm. long. As a rule it is attached to the underside of a leaf, and not, as in *tenella*, at the edge. I have, however, only seen eggs laid in captivity, under as natural conditions as could be given. The eggs were laid singly, or in well-spaced clusters of three or four. In a few days they became greyish, and just before hatching, pale biscuit-coloured.

The young larva is at first about 1·3 mm. long, white, with ill-defined, pale buff-coloured transverse lines on the body. In a few hours the head exhibits two fine diverging lines running from behind forward to the points of insertion of the antennae.

In the second instar the head markings have assumed their final pattern. The body is cream-coloured, with a pair of latero-dorsal chocolate-coloured bands running its entire length, as in the third instar-larva. Laterally there are two faint longitudinal chocolate-coloured lines on each side. On the whole there is very little difference between second- and third-instar larvae.

Description of Third-instar Larva. (Plate XLI, fig. 2.)

Length about 7 mm. when full grown. Colour, cream or yellow, with a pair of latero-dorsal chocolate-coloured bands running the whole length of the body. Setigerous warts not much developed. In form and coloration intermediate between *flava* and *tenella*.

Head white or pale yellow, with dark brown markings, consisting of two diverging lines running from the base forward to the points of insertion of the antennae and jaws. Posteriorly these are broader and tend to spread laterally. In the middle of anterior margin of head are two dots, and about the centre of the dorsal surface two more dots. These are evidently traces of the parallel lines, which in most Chrysopids run from the middle to the anterior margin of the head. Laterally, the head is fuscous, sometimes as two faint lines above and below each eye. Eyes black; antennae and palpi dark brown; jaws castaneous, darker at tips.

The body colour is creamy-white or often bright yellow, with a latero-dorsal band, dark brown or crimson, running on each side of the more yellow central area.

The prothorax has two elongate, dark brown, shiny sclerites imbedded in the longitudinal brown bands. Meso- and metathorax have each a smaller pair. The lateral prominences of these two last segments are more conspicuous than any others of the body, and are yellow in colour. Central area of thorax, yellow.

In the abdomen, the latero-dorsal chocolate-coloured bands are more broken up, diffusing into the central area and also sending laterally a small process forward, in each segment, enclosing a yellow spot. A median brown line runs the greater part of the body length. Laterally there is a dark brown line, often two, on each side. As previously mentioned, the warts and lateral segmental prominences are less pronounced in this than in other species. Legs white, semitransparent, joints and tips of tarsi blackish.

A small white cocoon, 3–4 mm. long, is spun for pupation, and, in a week or so after spinning, the pupa is disclosed, followed by the appearance of the imago in the space of another two to three weeks. The pupa is at first of a pink colour with longitudinal pale crimson bands in the position of the larval dorso-lateral bands, and on each side of the future imaginal dorsal vitta. In a few days the pink colour is replaced by green, the eyes become golden, and general colour is that of the imago.

Eggs laid.	Hatched.	Av. Temp.	1st moult.	2nd moult.	Cocoon.	Pupated.	Emerged	Av. Temp.
29/5/22	6/6/22	62° F.	12/6/22	18/6/22	29/6/22	6/7/22	23/8/22	63° F.
1/8/21	8/8/21	70° F.	13/8/21	20/8/21	30/8/21	5/9/21	16/9/21	66° F.

Eggs in the first case above were obtained from a hibernated female. The second example is that of the second brood. Both sexes of the second brood hibernate in outhouses, thatch, piled wood and other shelter, and may be brought out in mid-winter by a warm spell. A male and female were thus found in a greenhouse on the roof of the Royal College of Science, London, on the 7th December, 1921, artificial heating having been commenced the day previous. On emergence, the specimens which are to hibernate are green in colour, but in time some assume a reddish hue (*carnea* Stephens). This red form is not confined to either sex, but appears quite at random. In the case of the pair

just mentioned the male was of the form *carnea*, and the female normal green. Late in autumn of the same year a green male was captured and a red female. Examples taken in spring show the same diversity of colour, some being green and others red. Whether the insects can reassume their green colour in spring I cannot say, but eggs have only been obtained from green females.

Throughout the whole winter the sexual organs remain immature and the body cavity is filled with fat-body. Also it is interesting to note that the spermathecae of females are empty during the winter, so that it is clear that pairing does not take place until the spring. Thus *Chrysopa vulgaris* is a very interesting exception to all the rest of our British species.

Chrysopa tenella Schneider.

Wing expanse 22–30 mm. A delicate little species, with a pale yellow dorsal vitta. Somewhat similar to *C. vulgaris* in appearance, but venation as in all the other species of *Chrysopa*. The head has a black spot on each side, on the genae, and also on the sides of the clypeus. Palpi annulated with blackish. Pronotum immaculate.

Forty or fifty years ago this species was apparently exceedingly rare in Britain, and was not included by MacLachlan in his monograph of 1868. Now it is one of the commonest species of *Chrysopa* in suburban gardens and elsewhere. In 1878 MacLachlan (10) recorded the species as British, and remarked that it was apparently inodorous. This is certainly not the case, a very powerful odour having been observed on several occasions.

C. tenella first makes its appearance about the middle of May, and continues on the wing throughout June and July. A single specimen has been observed to emerge in August, from eggs laid the same year, but otherwise there is no evidence of a second brood.

The egg (Plate XLII, fig. 8) is very characteristic and can be confused with no other species that I know of, with the possible exception of *C. vulgaris*. It is ·8–·9 mm. long, pale green, and borne upon a very short, rigid stalk only 2–3 mm. long. The stalk is fixed to the edge of a leaf, and projects outwards from it, in the same plane as that of the leaf. The point of fixation is generally the apex of a tooth of the leaf margin. Occasionally an egg may be found projecting into the space eaten from a leaf by a caterpillar, but always the

egg and its stalk lie in the leaf plane. This renders the egg, always laid singly, almost invisible. Less frequently a footstalk may be found attached to a projecting point anywhere on a tree. In four to five days after laying, the colour is greyish, this then begins to lighten, and just before hatching is whitish-buff. Young larvae escape in from ten to twelve days after oviposition (65° F.).

Within a few hours of hatching, the head markings are visible. These generally are quite as in the full-grown larva. The body is pale brownish or grey. The second-instar larva appears much as does that of the third instar in markings and general colour of the body.

Description of Third-instar Larva. (Plate XLI, fig. 3.)

Length 6–7 mm. Body laterally with conspicuous setigerous warts. Colour usually dirty white, with grey, or other dark markings. Meso- and metathoracic warts and prominences conspicuously white, marked off by short, dark, oblique fasciae.*

Head whitish, markings dark brown, consist of two pairs of diverging lines from the base running forwards. Between these, starting from the middle of the head, is another pair of diverging lines reaching to the base of the mandibles, and in the middle of anterior margin, often two small dashes which may fuse with the last, or may be small or absent. Laterally is a faint line passing through the eyes. Eyes black; antennae blackish or fuscous, as also palpi; jaws castaneous, dark at tips.

Anterior portion of prothorax white, including warts; sclerites greyish, margined with darker. Laterally to these, body is white, between them, the dorsal surface is greyish, but lighter in the middle line. Meso- and metathorax wirh lateral prominences and warts conspicuously white, sharply marked off by an oblique, latero-dorsal mark of dark colour on each segment. Warts are sometimes pink. Between the two oblique markings the median area is lighter greyish.

Abdomen greyish above, due to mottling, often with dark crimson. Lateral warts whitish, less developed than on the thorax. No definite latero-dorsal longitudinal bands. Ventrally the body is whitish. Legs translucent greyish or greenish-white; ungues, and near same darker.

* In some larvae the ground-colour is reddish instead of white, but the darker markings will always be found fairly constant, so that there is no difficulty in identification.

In all stages larvae of *C. tenella* may be found carrying debris on their backs. In some examples a considerable coat is carried, in others little or none.

A very small cocoon, 3 mm. long, is spun for pupation. The pupal stage is of from two to three weeks' duration. Winter is passed as a larva within the cocoon.

Eggs laid.	Hatched.	Av. Temp.	1st moult.	2nd moult.	Cocoon.	Av. Temp.	Pupated.	Emerged	Av. Temp.
31/7/20	11/8/20	65° F.	17/8/20	26/8/20	12/9/20	64° F.	14/5/21	26/5/21	64° F.
31/7/20	11/8/20	65° F.	17/8/20	28/8/20	24/9/20	63° F.	14/5/21	1/6/21	63° F.
15/6/21	26/6/21	66° F.	2/7/21	6/7/21	16/7/21	72° F.	28/7/21	16/8/21	70° F.

In the table, the first and second each give a fairly typical life-history, showing variation in length of stages in larvae from one batch of eggs. The third case gives the time taken by the only example I have known to emerge the same year.

Chrysopa tenella has been found as a larva feeding upon aphids on low plants, as dock, also on trees. Frequently eggs are laid upon apple, the larvae preying easily upon woolly aphis, since their long setae ward off the woolly wax, which would otherwise clog the spiracles. Larvae have been found feeding on the following, which are selected from a far larger list.

Dock, *Aphis rumicis* L.
Grape vine, *Pulvinaria betulae* L.
Apple, *Eriosoma lanigerum*, Hausm.
Pear, *Bryobia praetiosa* K., and *Euthrips pyri* Dan.

The pear mentioned was one on which *Conwentzia psociformis* had been successfully introduced, and almost the entire colony was wiped out by *Chrysopa tenella*, which preyed upon both larvae and pupae of the Coniopterygid.

Chrysopa alba L.

Wing expanse 22–30 mm.

C. alba is well named, being generally of a pale whitish-green colour, though sometimes of a richer green in life. The eyes are darker than those of other species of *Chrysopa*, and though also relatively smaller, are very conspicuous.

The head and its appendages are, as a rule, unmarked, but in some examples, especially those of a fuller green colour, the palpi may be banded with blackish. Thus such examples approach very nearly to *C. flavifrons*, and this resemblance is sometimes increased by the head being entirely yellow in colour. The head itself, however, and the pronotum are always immaculate. The characters which I have found most useful in separating *alba* from similar species, are firstly the strongly ciliated costa, and secondly the long subgenital plate of the male. In other British Chrysopids the costal cilia are not so long and do not stand out so straightly from the margin, but rather tend to lie down along the costa. I am, nevertheless, strongly of the opinion that we have here two forms which are at least to be regarded as subspecies, and which are quite as distinct as *C. prasina* and *ventralis* are from one another. This difference is also observable in the larva. Typical *alba* larvae have very long thoracic warts, as figured, while in the form of which the imago has black marked palpi the larval warts are much shorter and more like those of *C. flavifrons*. *C. alba* is one of the most difficult species to breed that I have as yet encountered, usually dying in the second or early third instar, or in winter when within the cocoon.

The favourite haunts of this species are shady deciduous woods, where it is often extremely abundant in June and July. There appears to be no second brood.

Eggs are laid singly or in very well-spaced clusters of three or four on the undersides of leaves. This applies to both forms. The egg is ·8 mm. long, pale green in colour and borne by a stalk about 5 mm. in length. As hatching approaches the colour becomes whiter, and the eyes of the embryo, also brown transverse lines indicating the segments of the abdomen, appear.

The young larva is about 1·3 mm. long, white in colour, later with a tinge of brown or grey. The head markings appear after some hours, but are variable and not generally as in the older larva. Sometimes there is a black patch on the posterior part of the head, from which two diverging lines extend forward in the direction of the bases of the jaws. In other examples only the two diverging lines are present. Skins are placed on the back with the jaws, later the load increases, and the cast skin at each moult is added to the coat. The larvae are sluggish, and at first

have a habit of resting with the abdomen raised. In the second instar the head markings are fairly typical, the warts not quite as elongate as in the full-grown larva. The colour of the body is wholly white.

Description of Third-instar Larva. (Plate XLI, fig. 4.)

Length of full-grown larva 6–7 mm. Body white, almost devoid of markings, with very long thoracic warts.

Head greyish-white, markings blackish, consisting of two lines, broad posteriorly, narrowing and diverging as they run forwards in the direction of the antennae, at the bases of which they generally terminate. Between these, two parallel lines start close together just in front of the middle and run to the anterior margin of the head, where they expand laterally. Such markings are always present. The following are often found, but sometimes indistinct or diffuse: outside the two first-mentioned diverging lines, running from the base of the head to the eyes on each side, is a diffuse line, and the sides of the head are greyish as far forward as the eyes. In some cases these two last markings run into one another. Eyes black; antennae smoky-white; jaws castaneous, especially at the tips; palpi pale castaneous.

Thorax white, with very long warts. These warts are white and opaque, as the rest of the body, except for one-third of their length from the apex, which is transparent. At the apex of each wart is a tuft of bristles. Usually on the prothorax three of these bristles are black, the rest colourless; on the meso- and metathorax apparently only one bristle in each tuft is black. The two prothoracic sclerites are somewhat triangular, shining blackish. Meso- and metathoracic sclerites smaller and blackish. Between each pair is a sunken line. On the mesothorax, anterior to the afore-mentioned sclerites are two more pairs of small black sclerites.

Abdomen white, with segmental prominences less distinct and warts not elongated. A median dorsal blackish line runs the greater part of the length of the abdomen, but is less distinct in the thorax. Underside wholly white. Legs translucent and colourless, except the tarsi, which are darkened.

A very compact coat of skins and other debris is carried on the back, with the hooked body setae firmly holding it in position. The larva uses the coat as a shield, and can move it forward or from side to side when attacked. Often webs are found interwoven with the skins, but I do not think

these are spun by the larva, since the silk glands would not be so early functional.

There is, to my mind, not the slightest doubt that this species is the larva figured in the "Cambridge Natural History," p. 467 (11), as that of *Hemerobius*. The long warts are well represented.

A small cocoon, 2·5–3 mm. long, is spun for pupation under the larval coat. How this is done is difficult to imagine. The larvae are always very sluggish, and one day, on touching the apparent larva, it is found to be immovable, the coat only forming the covering of the cocoon. Many examples have been seen in which the cocoon has been spun on the flat underside of a leaf, and not, as is more often the custom with *Chrysopa*, in a curled-up leaf, or among other supports.

Eggs laid.	Hatched.	Av. Temp.	1st moult.	2nd moult.	Cocoon.	Av. Temp.	Pupated.	Emerged	Av. Temp.
15/7/21	21/7/21	75° F.	30/7/21	11/8/21	26/8/21	69° F.	20/5/22	3/6/22	70° F.
16/7/21	23/7/21	76° F.	30/7/21	10/8/21	27/8/21	69° F.	?	5/6/22	—

Larvae of *C. alba* are of sluggish habits, but can run fairly rapidly. In feeding they are timid, and if the intended prey moves too much, the larva retracts its head for protection under the carapace-like coat. Food consists naturally of the woolly *Phyllaphis fagi* L., on beech, and also, I should expect, *Cryptococcus fagi* Baer. Larvae are also found commonly on oak; of their food I have no definite observations, but many aphids, etc., were present. In captivity the larvae show a decided preference for less active aphids, such as the woolly species and *Phylloxera*. The woolly wax does not in any way inconvenience *C. alba*, owing to its body being entirely protected.

Chrysopa flavifrons Brauer.

Wing expanse 24–31 mm. Head yellow, rest of body green, but slightly yellow on the dorsum of thorax. Palpi annulated with black, the terminal joint being wholly blackish. This species can at once be distinguished in life by the head being yellow except for the eyes, mouth-parts, and an orange line one each side.

The species appears to prefer pine woods, but has also been taken from deciduous trees. The time of appearance

is from June until August, sometimes later in autumn, which is rather a long period on the wing for a *Chrysopa*, and suggests the possibility of two broods.

The eggs are laid in a similar way to *C. flava*, the stalks being united in a bundle. Each egg is ·8 mm. long, pearly white in colour when first laid, sometimes with a tinge of green. As hatching approaches, the colour changes first to pale buff, then brown, and then greyish-brown. The stalks are 6–7 mm. long, fixed to the undersides of leaves, close together in a bundle. These eggs may be distinguished from those of *C. flava* by their slightly smaller size, by the more flimsy stalks, and consequent closer hanging together of the eggs in a terminal cluster.

The young larva is white with a dusky head, the blackish markings almost covering it. The body bears well-developed setigerous warts, and the general facies is much like that of *C. prasina*. The second-instar larva is similar to that of the third, but the head markings may be a little less separated. A coat of debris is carried throughout life.

Description of Third-instar Larva. (Plate XLI, fig. 5.)

Length 6–7 mm. Head markings similar to those of *C. tenella*, body white, with setigerous warts as in *C. prasina*.

The head is whitish with dark brown markings. These are of the same pattern as those of *C. tenella*, but usually bolder. There is a pair of diverging lines from the middle of dorsal surface to the anterior margin. From base of head a pair of lines runs forward diverging to the antenna bases, outside these, and parallel to them, another line on each side runs towards the eyes. On either side of the head is a broad black line. Eyes black; antennae and palpi grey; jaws castaneous.

Body white, best contrasted with *C. prasina*, from which it differs as follows. The thoracic warts are larger. The setae from these are spread more laterally and fan-like from each wart. Prothoracic sclerites grey, consist of two outer large sclerites and a trace of a median sclerite, not, as in *prasina*, large. Meso- and metathorax have each a pair of grey sclerites.

Abdomen with smaller warts and also hooked setae for carrying debris. The contents of the stomach often show through the skin, blackish. A dark median dorsal line runs the greater part of the body length. Underside whitish. Legs grey or fuscous.

Likely to be confused with either *C. prasina* or the

short warted form of *C. alba*. The head markings and prothoracic sclerites are the most reliable distinctive characters.

This is a difficult species to breed, and I have reared none completely from the egg. This year promises better, and some two or three dozen larvae are now (Sept. 15, 1922) fully fed for the second instar. These hatched 17/8/22 and 20/8/22 from eggs laid 1/8/22 and 4/8/22 respectively. It appears that the larva hibernates when in this stage, though sometimes in the third instar. More evidence is necessary, however.

Chrysopa prasina Burmeister (= **aspersa** Wesmael.).

Wing expanse 24–34 mm. This species and the next are very closely allied, although in appearance quite distinct. The colour is bright green. Head with a black spot between the bases of the antennae, and other spots on the front. Palpi annulated with black. The pronotum has black or brown spots on each side, tending to form longitudinal lines. Wings with a black spot at the extreme base of the costa. On each side of the abdomen a black line frequently appears. Sometimes this is indicated by little more than a few faint dots, but other specimens show quite distinct black lines. Variations of this and a more pronounced character caused MacLachlan (9) to suggest that *C. prasina* and *ventralis* might very possibly be varietal forms of one another.

After giving much attention to this matter I am inclined to consider both distinct, although further work is desirable. Breeding is difficult to carry out, owing to the fact that the larva hibernates in the second or third instar and is then particularly liable to attack by a fungoid disease. All of both species which have successfully passed the winter in captivity have emerged true to their parentage. The larvae of both are very similar, but can as a rule be distinguished. The imagines are often found together, but equally often in separate localities. Two examples from the current year will illustrate. On the 17th June, 1922, twelve specimens of *ventralis* were beaten from oak at Oxshott, but not a single specimen of *prasina* was taken. The following Saturday (24th) large numbers of *prasina* were beaten from pine and birch, within a mile of the previous locality, but not one example of *ventralis* was taken.

Chrysopa prasina is a woodland species giving preference to pine woods. The duration of imaginal life is from the beginning of June to the end of July, sometimes later.

Eggs are laid on pine needles or on the undersides of leaves, etc., being generally deposited singly, or at most six together, well spaced apart. The egg is bright green in colour, ·8–·9 mm. long, and attached at the end of a stalk of about 6 mm. in length. After two to three days a yellow patch appears on one side, later the green turns to grey, and just before hatching the segmentation of the embryo is discernible from outside. The larva escapes in from seven to eleven days after oviposition.

The first-instar larva is white in colour, the head being also white with black markings. These markings are of the same pattern as in the later larva. The three distinct black sclerites on the prothorax are very typical of this species. Skins and other debris are placed at once on the back, on hatching, and a fairly dense coat is carried throughout the whole of larval life. The larva is thus similar to *alba* and *flavifrons*. Larvae found on pines infested with *Chermes* add to their coats some waxy wool of the aphids.

In the second instar the larva is similar to the full-grown larva, except in size.

Description of Third-instar Larva. (Plate XLI, fig. 6.)

Length when full fed 6–7 mm. Body white, with setigerous warts. Markings few, blackish. Three large black prothoracic sclerites.

Head smoky with blackish markings which often almost cover it. Two broad black lines run forward from the base of the head, giving off a branch to each eye and then diverging from each other to the bases of the antennae. A triangular black mark is enclosed in the middle of the anterior margin. These markings tend to spread entirely over the head. Eyes black; antennae and palpi blackish; jaws castaneous, distally darker.

Thorax white, with conspicuous warts bearing long setae. On the prothorax are three shining blackish sclerites, the two outer ones slightly larger than the median one. In both *prasina* and *ventralis* these three sclerites are highly characteristic, and though a median sclerite is found in many other Chrysopids it is generally small or but slightly pigmented. The meso- and metathorax have

each at least one pair of blackish sclerites, those of the mesothorax being the larger.

The abdomen is white, with smaller warts bearing long setae. A median dark longitudinal line may be present, and along each side of the body, rather ventrally, there is often a black line, varying in intensity. In dark examples a small black spot or two may be found at the base of each wart. Legs blackish.

Shortly after spinning the cocoon in spring, the pupa is disclosed, followed by the appearance of the imago in about two weeks.

Eggs laid.	Hatched.	Av. Temp.	1st moult.	Av. Temp.	2nd moult.	Av Temp.	Cocoon.	Pupated.	Emerged	Av. Temp.
6/7/21	13/7/21	74° F.	18/7/21	75° F.	7/8/21	72° F.	20/5/22	26/5/22	11/6/22	69° F.
6/7/21	13/7/21	74° F.	18/7/21	75° F.	4/5/22	winter	22/5/22	28/5/22	9/6/22	69° F.

The first example above is that of a larva which wintered in the third instar, the second hibernated in its second instar. Both are selected from the same brood of eggs. The larvae as a rule feed ravenously until, apparently awaiting a second moult, they become sluggish and will not feed. This is often in quite hot weather, as seen above. An aphid may be accepted occasionally, and the larva must be provided with food always. At last the second moult occurs, or the larva may hibernate while still in the second instar. In the third instar the same falling off of appetite is observed when apparently full fed, and so the winter is passed. With the warmth of spring or even in warm spells during the winter, food is taken, and the second moult, if necessary, occurs some time in April or May. Now feeding is recommenced in earnest, and the larva feeds well until spinning. The pupal stage is short.

In young pine plantations, infested with *Chermes*, larvae may be found during winter and spring, probing the woolly masses of aphids and sucking out nutriment. I believe that, owing to its frequent abundance, *C. prasina* is a real check on this difficult pest to forestry. In a similar way the larva has been found feeding on *Crypto-coccus fagi* Baer. on beech, also on aphids on oak. In the single instance of a larva being found in Epping Forest on a heath, the only evident food was a small Jassid,

Ulopa reticulata Fab., present in numbers at the base of the heather, where the larva must have hibernated, since no trees were near.

Chrysopa ventralis Curtis.

Wing expanse, 24–34 mm.

The remarks made upon *C. prasina* may be repeated for this species, with the exception that the ventral surface of the abdomen is black. This is a very constant feature, and variations in the direction of *prasina* are not common. Habitat and time of appearance are the same as for *prasina*.

Eggs and first-instar larva not distinguishable from *C. prasina*. It may be only accidental that all eggs under observation took longer in hatching (eleven to fourteen days) than do those of *prasina*. The difference cannot be accounted for entirely by temperature, apparently. In the second instar the larva is quite distinct from *C. prasina*, and a miniature of the third-instar larva. A coat of debris is carried.

Description of Third-instar Larva. (Plate XLII, fig. 1.)

Length 6–7 mm. Body white and as *prasina*, but with more black markings.

Head blackish, markings are of little value and can often not be distinguished from those of *prasina*, but the following differences are sometimes present. The triangular black area on the anterior margin of the head of *prasina* is, in *ventralis*, often lighter in the middle and thus V-shaped. The line running to the base of each antenna is darkest near the antenna base. Eyes black; antennae and palpi blackish; jaws brown.

The shape and general colour of the body are as in *prasina*. The middle one of the three prothoracic sclerites is often, though not always, unpigmented and apparently absent. In front of and behind the two lateral sclerites, which are always blackish, is an area of black hypodermal pigment, thus making with the sclerites a black latero-dorsal band on each side of the prothorax. Meso- and metathorax are less marked with black, though on the former are a few small spots. At the base of each wart, however, on the upperside, is a distinct black spot and a smaller one behind each wart.

The abdomen is covered with the usual hooked hairs of a debris-carrying form, but is practically immaculate. The ventral surface

of the body is quite characteristic and much marked with black or very dark brown.

The head below is uniformly dark brown. Legs blackish. In the mid-ventral line, between each pair of coxae, are two blackish spots, tending to fuse as one. These are often continued on the abdominal segments, though less distinctly.

On the abdomen, ventrally, running the length of each side, is a broad blackish band, and nearer the mid-ventral line another similar band. The entire under surface tends to become black, as in the imago. While all the differences here indicated are generally present, larvae sometimes so closely resemble *prasina* as to be hardly distinguishable.

There is no object in giving further particulars of the life-history, which has only been observed to differ from that of *prasina* in the longer incubation period of the egg, and this may not be normal.

Chrysopa septempunctata Wesmael.

Wing expanse 28–40 mm. Body uniformly full green in life. A black spot between the basal joints of the antennae; front spotted with black.

C. septempunctata can only be confounded with *C. prasina*, which latter has, however, a black spot at the extreme base of the costa, absent in *septempunctata*.

In gardens and orchards, even in towns, this species is one of the commonest and incidentally also one of the most malodorous of the species of *Chrysopa*. It occurs from the end of May until early July. In August a second and smaller brood may occur, and individuals of these have lived until mid-October (1920).

Eggs are laid singly, or more often in fairly close clusters of up to about twenty, on the undersides of leaves or sometimes on tree-trunks and twigs, in the vicinity of aphids. The species appears to have a *penchant* for beans (attacked by *Aphis rumicis* L.), rose and apple trees. The egg is about ·9 mm. long, green when laid, supported on a footstalk of from 7–8 mm. length. In four or five days it assumes a greyish tint, darkening until hatching, which takes place in from six (70° F.) to nine (60° F.) days.

The young larvae rest for a time on the empty eggshell, then descend to the attaching surface and often reascend other egg-stalks to suck out the juices of their, as yet

unhatched, brothers. The first-instar larva is light greyish-brown in colour, with the head almost entirely black. Generally the body is devoid of markings. In the second instar some differentiation of head pigmentation occurs, and in a few cases the larva is very similar to the third-instar larva. Most, however, at this stage, are not so brightly coloured as when full grown, although the body frequently has indications of later markings. It is rare to find a larva in its second instar with the very characteristic red central dorsal area of the older larva.

Description of Third-instar Larva. (Plate XLII, fig. 2.)

Length when full fed about 8 or 9 mm. Body covered with setigerous warts. General colour greyish-brown, with a more or less bright brick-red central dorsal area in the meso- and metathorax. The first two lateral abdominal prominences and warts are also red.

Head white with a black central mark extending from the middle to the anterior margin. Two larger patches of black diverge from the base of the head almost to the eyes. Occasionally there is a variation of head markings in the direction of *C. perla*, but I have never seen a form which could be confused with *perla*. Antennae greyish; palpi white at bases, becoming grey distally; jaws castaneous, darker at tips.

Prothorax whitish anteriorly; between and behind warts, dark brown. Sides whitish. Sclerites shining black, somewhat trapezoidal in shape. Meso- and metathorax dorsally dark brown, with a median area of bright brick-red colour. The dorsal surfaces of the mesothoracic lateral prominences are much lighter in colour than the metathoracic prominences, which are, including warts, almost black above. Sclerites are small, rounded, and shiny black. The smaller warts lying within the red central area are whitish.

Abdomen mottled with greyish-brown above, laterally between the segments whitish. There is little indication of a lighter median area, though often there is a slight continuation of the central red area from the thorax into the anterior segments of the abdomen. The first two lateral abdominal prominences, with their warts, are usually red in colour, the remaining abdominal prominences being brown, sometimes with a flush of red. A median dark brown line runs the whole length of the body. Underside, greenish-white with indications of brown longitudinal lines on each side, latero-ventrally. Legs translucent greenish-white, smoky just below the knees and also at the tips of the tarsi.

These larvae, and also those of some other species, *e. g. perla* and *dorsalis* have a curious attitude of resting on a surface, especially when a firm grip is desirable, as when feeding on a large aphid. The abdomen is extended and fixed by the anal papilla. The legs having obtained a firm hold, the abdomen is now arched, so that considerable tension exists between the two regions of fixation and a very firm grip is obtained.

The pupal stage lasts from two to three weeks.

Eggs laid.	Hatched.	Av. Temp.	1st moult.	2nd moult.	Cocoon.	Av. Temp.	Pupated.	Emerged	Av. Temp.
20/6/20	27/6/20	68° F.	2/7/20	8/7/20	18/7/20	64° F.	13/5/21	26/5/21	64° F.
27/6/20	4/7/20	66° F.	10/7/20	14/7/20	20/7/20	66° F.	1/8/20	18/8/20	65° F.

The two above examples give a fair idea of the times taken in each stage. The first was fed entirely on apple woolly aphis. The second lived from the time of emergence 8/8/20 until 9/10/20, and was then only killed by accident. It laid, in this time, ninety-four eggs.

Chrysopa septempunctata is one of the few insects which naturally feed upon woolly aphis, *Eriosoma lanigerum* Hausm. I have frequently found larvae thus engaged. No debris is carried by the grown larva, but at first there is a tendency to do so.

Chrysopa perla Linnaeus.

Wing expanse 24–30 mm.

C. perla is one of the two British blue-green Chrysopids and can be confused with no other except perhaps *C. dorsalis*, which is also blue-green in colour. Both species are conspicuously marked with black and the abdomen is far more black than green, as a rule. *C. perla* differs from *dorsalis* in its more bluntly rounded wings, green subcosta, and tarsal claws dilated at the base internally.

This is one of the most abundant of British Chrysopids in deciduous woods, but not often seen in gardens. The type of woodland preferred is one of hazel and hawthorn undergrowth, although the species also frequents lanes and hedgerows. In old oak or beech woods with little undergrowth, as in some parts of Epping Forest, it is

uncommon. Frequently *C. perla* is to be met with in pine woods. The first brood appears about the middle of May, and by the end of June has generally died out, stragglers may be found, however. The second brood, which is always small, occurs from the end of July throughout August. The majority of the insects do not emerge as a second brood, but pass the winter as larvae within the cocoon.

Eggs are laid on the undersides of leaves, being mainly found on hawthorn, hazel and field maple. They are laid singly, or in well-spaced clusters of not more than six, under natural conditions, but larger clusters have been obtained in captivity. The egg is ·9 mm. long, colour pale green when first laid. The stalk averages 6 mm. in length. In a day or so, patches of yellow appear through the egg-shell, especially at the micropylar end, and in three or four days the general colour is greyish. Finally, brown lines indicating the segmentation of the embryo within appear, and about eight or nine days after oviposition hatching takes place.

The newly-hatched larva is nearly 2 mm. long, body colour pale greyish-brown. The head is dark brown or blackish, dorsally the black colour may be divided into three main areas. In the second instar the head may exhibit the characteristic markings, but this is not always the case, and one must often wait until the third instar before a larva can be definitely distinguished from that of *C. septempunctata*. The colour of abdomen and thorax is now brownish-white with vaguely defined darker brown latero-dorsal bands, leaving the sides and central dorsal area lighter in colour. The metathoracic lateral prominences are always darker than those of any of the other segments. Sometimes larvae in their second instar are almost exactly as in the third, and can then, of course, be identified at once.

Description of Third-instar Larva. (Plate XLII, fig. 3.)

Length about 8 mm. when full fed. Body covered with conspicuous warts bearing tufts of setae. General colour dark brown on a creamy-yellow or greenish-white ground.

Head whitish, markings black. A central, elongate-oval spot extending from the middle almost to front margin of head. Two

latero-dorsal larger splashes, incomplete anteriorly, leaving a bay into which a small projection passes. Running forward along the sides of the head are two faint lines reaching almost to the eyes. The underside has two diverging grey marks and between these a smoky patch. Eyes black; antennae and palpi greyish; jaws greyish or castaneous, darker towards the tips.

Prothorax, in front of a line drawn between the two warts, whitish; behind this line the central area is dark brown, sides yellowish-white. Prothoracic sclerites black and shining, triangular or somewhat trapezoidal, anteriorly slightly emarginate. Mesothorax with sides and median dorsal area of ground colour, yellowish-white; latero-dorsally dark brown. Sclerites small, blackish and oval. Metathorax, central area yellowish-white, lateral prominences and warts of same, very dark brown above. Below, and to a small extent posteriorly, the prominences are of ground-colour, yellowish-white. Dark brown metathoracic lateral prominences are characteristic of *perla* and *septempunctata*, and are often very noticeable. No other lateral prominences of the body are of such a dark brown.

Abdomen with sides yellowish-white. The latero-dorsal brown bands running longitudinally spread well toward the central area, so that the yellowish ground-colour is not always apparent here, although the brown pigmentation is always less dense in the middle line. Besides the warts on the lateral segmental prominences there is also another pair of conspicuous warts nearer the middle line of each segment. All these are yellowish-white. Other smaller warts occur on the body. The median dorsal longitudinal line appears dark brown, and dilates in the posterior third of each segment as usual. The underside of the body is yellowish- or greenish-white, with indications of two lines latero-ventrally. Legs translucent whitish, tarsi blacker at tips.

In the first instar, the instinctive action of the larva on hatching is to cover itself with refuse. Later there is rarely any such coat carried. Often when disturbed, the larva, in its second or third instar, immediately rolls itself up into a ball and drops to the ground, remaining motionless for some minutes. This habit is not found in other Chrysopids, except *septempunctata* and *dorsalis*.

A cocoon, about 3·5 mm. long, of ordinary form, is spun for pupation. The pupal stage lasts two to three weeks.

Eggs laid.	Hatched.	Av. Temp.	1st moult.	2nd moult.	Cocoon.	Av. Temp.	Pupated.	Emerged	Av. Temp.
26/6/21	5/7/21	67° F.	7/7/21	9/7/21	15/7/21	74° F.	21/7/21	2/8/21	74° F.
26/6/21	5/7/21	67° F.	7/7/21	9/7/21	15/7/21	74° F.	24/5/22	9/6/22	62° F.
30/6/21	9/7/21	69° F.	11/7/21	14/7/21	21/7/21	76° F.	?	31/7/21	73° F.
30/6/21	9/7/21	69° F.	11/7/21	14/7/21	20/7/21	76° F.	10/5/22	26/5/22	58° F.

In the above table I have selected examples from the hot season of 1921, because they give periods occupied when a second brood appears. The great majority do not emerge the same year, but winter as larvae within the cocoon, pupation and emergence occurring the next year. Others, however, showing no special promise as larvae, pupate almost at once and emerge the same year. The larvae feed upon all small insects, etc., and are not at all particular as to species, although in nature they do not apparently prey upon woolly aphids of any kind.

Chrysopa dorsalis Burmeister.

Wing expanse 28–30 mm.

This species much resembles *C. perla* in colour, from which it can at once be separated by the more narrow and acute wings,—in *C. perla* the wings are broadly rounded —by the black subcosta, and by the simple and undilated tarsal claws.

C. dorsalis is of very local occurrence in Britain. First discovered in 1900 at Oxshott, it was not found there again until 1921, by myself. Mr. E. A. Atmore has taken the species with fair regularity near King's Lynn, and Mr. B. S. Harwood in 1917 near Colchester. I have also found it at Bagshot (1922), and it is probably to be taken throughout the whole of the Surrey coniferous area. It is entirely confined to pine woods.

The only example which I have bred from the larva emerged on the first of June, 1922, under outdoor conditions, but the normal season of appearance is July with a slight overlapping of June and August. *C. dorsalis* is much more active and rapid in flight than its relative *perla*.

Eggs I have not seen. Miss Alderson (2) describes them as ·8 mm. long, oval in shape and rich green in colour. The footstalk is about 3·5 mm. long. They are laid singly

on pine needles. The egg darkens to greyish just before hatching, which takes place on the eighth to tenth day.

The larva recalls that of *C. perla* in the colour and markings of the body, but in build it is a little more slender. The head markings are distinctive, and also there is a dark madder subspiracular line which is more distinct and less interrupted than in *perla*. The latter is, however, probably not a reliable character. The second-instar larva does not differ materially from that of the third instar.

Description of Third-instar Larva. (Plate XLII, fig. 4.)

Length when full fed 8 mm. approximately. General facies as in *C. perla*.

Head greyish-white, markings on dorsal surface dark brown to black. Two dark lines run forward from the base, diverging from one another about mid-way of their course to enclose a triangular space in which are two parallel dashes which broaden slightly towards the anterior margin of head. From the bases of the two diverging lines first mentioned, on each side, is a short line running more laterally and ending just about the level of the eyes. Laterally, there are two almost parallel, ill-defined lines running from the base of the head, and ending at the eye on each side. Eyes black; jaws pale castaneous, darker at tips; other appendages greyish.

The body and its markings are similar to *C. perla*, and undoubtedly vary somewhat, so that no useful purpose would be served by giving a detailed description. My description of the larva and figure of head pigmentation do not agree with the figure given by Miss Alderson of the head markings, and the difference is so considerable that I would refer to her paper for comparison. If the head markings vary to such an extent in this species they can be of little specific value. I have myself only seen one larva from which the above description was made. Further observations would be most valuable.

Winter is passed as a larva within the cocoon. Pupation occurs in spring, and shortly afterwards the imago appears. Emergence was observed to take place at 6·5 p.m. (Greenwich time) on the 1st June, 1922. This example was a male. Being supplied with sweet food it lived for twenty days after emergence.

Nothochrysa capitata Fabricius.

Wing expanse 30–36 mm. Colour dark brown with head orange-brown. *Nothochrysa* is of very distinct appearance from *Chrysopa*, its colour being brown instead of green. There is also a venational character, *vide* MacLachlan (9).

The species appears to be confined to conifers, from which it may be beaten during July and August. Its flight is very peculiar, fairly rapid and direct. Impregnated females may be noticed in flight by the conspicuous white mass on the dorsal surface of the hind abdomen. It is not a common species.

Eggs (Plate XLII, fig. 10) are laid on pine needles; commencing at the tip of a needle they are deposited radially. From two to thirty-eight have been observed in a single cluster. The egg is oval, slightly more than 1 mm. long, and broader than the egg of *Chrysopa*. It is supported by a very stout and rigid footstalk about 7 mm. long. In the case of all eggs from vigorous females the stalk is knotted at regular intervals, or moniliform, as though it had been drawn out in a succession of jerks. This and its rigidity are very characteristic of *Nothochrysa*. In colour the egg is at first green, but later darkens to grey. Hatching takes place in from eleven to twelve days at 63° F.

The first-instar larva is buff-coloured, with the thorax slightly greenish. The head is dark. Legs translucent, colourless, tarsal claws and empodium black. All the setae on the dorsal surface of the body are hooked at their extremities and curl over the back. Some debris is carried throughout life. The second-instar larva resembles that of the third instar.

Description of Third-instar Larva. (Plate XLII, fig. 5.)

Length when full fed 9–10 mm. Colour dark brown with meso- and metathoracic prominences orange-brown, but not well developed.

Head above almost entirely fuscous or blackish, markings obscure, but there are two very distinct black spots about the middle, on border of frontal suture, always present. From the base of the head forward to frontal suture are two fuscous patches covering the hind portion of the dorsal surface. It is on the anterior margins of these patches that the conspicuous black spots are placed. Anteriorly to these, near the middle line are two or three more pairs of blackish spots, but often less conspicuous. Laterally the

head has a fuscous band, ventrally it is whitish. Eyes black; antennae and palpi fuscous or castaneous, the terminal joints of the latter darker; jaws castaneous.

Prothorax with very small warts, each of which supports but a single bristle. Anteriorly the prothorax is white, but the rest is dark brown mottled with chestnut or orange-brown. Sclerites blackish, consist of two latero-dorsally and two or four, generally less distinct and closely approximated, in the middle line. Meso- and metathorax dark brown with orange-brown lateral prominences bearing very small warts. Each wart supports only two or three weak bristles, frequently bent. Below the wart is a small dark brown spot. The middle part of the dorsum is dark brown with a few small whitish warts. There is a pair of blackish sclerites to each segment.

Abdomen dark brown above, but darkest at the sides, below and in the region of the lateral warts. Each wart supports several stiff bristles. The dorsal surface of the abdomen is covered with hooked setae. A whitish median line runs the length of the body, within which is the usual dark median line. Underside of body wholly yellowish-white. Legs translucent whitish to just above the knees, whence to the tarsi they are fuscous. In pale specimens this is not very noticeable.

N. capitata larvae can at once be identified by the ill-developed thoracic warts, the prominences bearing which are orange-brown, and by the two black spots in the middle of the dark-coloured head. Larvae carry debris on the hooked abdominal setae, but prefer few and large particles, not a dense coat of small particles. For pupation a small white cocoon, 4–5 mm. long, of Chrysopid form is spun, covered with debris. Winter is passed as a larva within the cocoon, pupation and emergence presumably occurring in spring.

Eggs laid.	Hatched.	Av. Temp.	1st moult.	2nd moult.	Cocoon.	Av. Temp.
18/7/22	30/7/22	64° F.	11/8/22	21/8/22	15/9/22	60° F.
27/7/22	7/8/22	63° F.	17/8/22	29/8/22	20/9/22	60° F.
27/7/22	7/8/22	63° F.	19/8/22	2/9/22	5/10/22	60° F.

Nothochrysa should be placed in quite a distinct sub-family from the rest of the Chrysopidae, for reasons which, however, cannot be entered into here. The main

biological interest in this genus will be the manner of pairing, which I have not yet seen. After pairing the female carries permanently a large, white body on abdominal tergites 6 and 7. These tergites are thin and not so strongly chitinised as the rest of the abdominal plates. The white mass is often distinctly divided longitudinally into two halves, and is decidedly hard as a rule. Its internal structure suggests a disorganised spermatophore, but I have reason to doubt this. After pairing, the spermatheca of the female is found to contain spermatozoa as usual. How the white mass is placed in this curious position and what is its function, are questions which future work must answer.

Family V. CONIOPTERYGIDAE.

This family comprises seven British species.

Conwentzia, two species.
Coniopteryx, two species.
Semidalis, one species.
Parasemidalis, one species.
Helicoconis, one species.

Minute insects, with reduced wing venation and covered with a white waxy powder.

Eggs (Plate XLIII, figs. 9, 10, and 13) are laid singly on the edges of leaves, etc. These are oval, flattened dorso-ventrally and pointed at the micropylar pole. The chorion is beautifully honeycombed, reticulate. Colour white, yellow or orange.

The larva (Plate XLIII, figs. 1–4) is shortly spindle-shaped, slightly flattened dorso-ventrally, smooth but for two or three transverse rows of fine hairs per segment. The head is small and rounded, partly retracted into prothorax in life. Eyes each of five ocelli. Antennae two-jointed, with a short basal joint and a long distal portion plumose with fine hairs. The labrum covers the conical mouth-parts above. Sucking spears are short and of simple form. The mandible is sharply pointed and slightly grooved ventrally. The maxilla is also pointed and with three barbs externally. It is not provided with sense organs as in other Neuroptera, but such sense hairs probably occur on the labrum. The labium is reduced, with a pair of

three-jointed palpi, the terminal joints of which are club-shaped.

The thorax is large and constitutes about half the body length. The three segments are nearly equal, but the prothorax is always the largest. There are several small sunken sclerites, serving as muscle attachments, in all the segments. Legs are well developed and relatively long. Tibia and tarsus are not very freely articulated. There are two simple tarsal claws and between these is a small, pad-like empodium. In the first instar the empodium is more pointed. The abdomen is small, but consists of ten segments, although these rapidly taper. The 10th abdominal segment, bearing the anus, is as usual, adhaesive. Larvae run rapidly and continuously, preying upon small forms of life.

For pupation a flat circular cocoon of white silk is spun, consisting of two envelopes, an outer and an inner, more or less separated from one another. The pupa (Plate XLIII, fig. 12) is short and somewhat square from thorax to head in profile, otherwise it is of typical Neuropterous form. Just before emergence it bites a semicircular slit in both envelopes with its pupal mandibles and then discloses the adult. The pupal skin is often shed while still within the cocoon, or when half-way out, or more rarely the pupa may first crawl right out of the cocoon. When the wings have been completely expanded, the insect presses them together several times in succession with its hind legs, apparently to rectify any tendency to buckle. The imago is at first pale in colour and without waxy covering, but in half an hour or so the wax glands commence to secrete and continue to do so throughout the greater part of life. The insect scrapes the abdomen with its hind legs to remove some of the waxy powder, then these are rubbed rapidly over and between the wings.

Pairing is peculiar in *Parasemidalis*. The male passes his head under the wings of the female and seizes her hind coxae with his jaws. Then grasping her hind legs with his fore legs, pairing is effected by bending up the tip of the abdomen. Thus the pair crawl about, separating in from five to ten minutes. I have reason to believe that there is no spermatophore in the Coniopterygidae.

The anatomy cannot be adequately dealt with here, as in many respects it differs in detail from general Neuropterous type.

In the larva, of the six Malpighian tubes, four are attached distally and two are free (Plate XLIII, fig. 5). The silk secreting cells swell, but apparently do not exhibit a ramified nucleus. Another feature of the Coniopterygidae is the great reduction in size and number of the abdominal nerve ganglia by concentration. Frequently there are no more than three, of which the last consists of several fused ganglia (Plate XLIII, fig. 6).

The wax glands of the imago must be noticed (Plate XLIII, fig. 11). These are unicellular dermal glands, arranged in definite areas of the body. Their presence is revealed externally by small perforations in the integument. Through the perforations wax is forced and takes the form of circles or short spirals. Wax-gland areas are mainly situated on the abdomen, there being here a pair dorso-laterally and another pair ventro-laterally. Other areas occur on the dorsal surface of head and thorax, besides minor patches occasionally at the base of the wings and elsewhere.

One more peculiarity of the Coniopterygidae is the marked development and dark pigmentation of chitinous sclerites. The tentorium of the head, thoracic sclerites and genitalia are all well marked and often specific in form.

The position here assigned to the Coniopterygidae is not to be taken as in any way indicating the true affinities of the family. The Coniopterygidae represent a very early offshoot from the Neuropterous stock, which have specialised early. The present existing forms, while resembling the Megaloptera in some respects, in others stand quite apart; an isolated family.

Conwentzia psociformis Curtis.

Wing expanse 7–8 mm. This species may be recognised by the strongly reduced hind-wings, common to the genus, by the cross-vein from R_1 to radial sector in fore-wings being between R_1 and R_{2+3}, and by the number of antennal joints, 38–43.

It is an exceedingly common species, being found often in abundance on oaks and many plane trees in the heart of London. Other trees are often selected, *e. g.* cherry, pear, sallow and holly. Less commonly I have found it on pines.

The first brood emerges from the cocoons in late April

(1921), May and June. The second brood appears in July and August. In nature both broods are liable to overlap, and some stragglers of the first spin up late and do not emerge until the following year. Stray imagines have been found even at the end of September.

Eggs are laid on leaves or bark. When on leaves, the usual position is at the edge, on the underside, sometimes at the side of a projecting vein. An oak leaf has the extreme margin slightly curled under, and it is in this curled margin that eggs are most frequently deposited. On holly and other leaves eggs are also laid at the margin. Placed singly, rarely two or three together, the egg is about ·5 mm. long, of elongate oval shape, somewhat flattened, and yellowish-white in colour. The chorion is beautifully reticulated, and at the micropylar end there is a small conical projection. The attached side of the egg is flattened. Very little change in colour is noticed, and in from one and a half to two and a half weeks hatching takes place.

The young larva is white, with the eyes blackish and mouth-parts also somewhat darker. The legs appear long and hairy. As food is taken, a brown central spot appears and the larva approaches the typical form.

Description of Third-instar Larva. (Plate XLIII, fig. 1.)

Length when full fed 3–3·5 mm. Body smooth but for fine hairs, swollen anteriorly and tapering to the anal extremity. General colour white with a large median brown spot (the colour of food in the alimentary canal), more or less broken up by white (fat body).

Head small, whitish and partly retracted into prothorax, in life. Antennae about ·75 mm. long, having a broad basal joint and a longer, rather narrower distal portion, plumose with fine hairs. The ratio of basal to distal portion varies in this species between 1 : 10 and 1 : 6·6. Eyes dark crimson, appearing black. Jaws castaneous. Palpi three-jointed, the terminal joint largest and swollen. On the sides of the head, the tentorium is visible through the skin as blackish lines.

Thorax broad, composed of three nearly equal segments. Prothorax white anteriorly and laterally, appearing dark brown in the centre. Mesothorax white laterally, the middle area of the anterior half, brown. In the middle of posterior half are two white spots, sometimes forming a complete white band across. The metathorax is similar to the mesothorax, but the posterior half often

forms a complete white band across the middle, and two white spots may extend forward from this.

The abdomen is about one and a half times the length of the thorax, and tapers to the posterior extremity. It is white laterally, brown in the middle, becoming paler and more yellow in the terminal segments. The first, and two of the middle segments of the abdomen, are usually white entirely, thus making gaps in the brown colour. Underside of body wholly white or greyish, darker in the middle line, due to gut contents being visible. The legs are long, hairy and whitish.

The markings here given are for a typical larva. There is much variation, however, and a series of sketches shows all stages in the encroaching of the white fat body on the middle darker area.

When about to spin up, the larva, if of the first brood, selects a site on the flat surface of a leaf, or on the bark of the tree. If of the second brood, spinning takes place always on the tree bark, preferably in a crevice, but often on a flat surface. The larva moves the anal spinneret to and fro over its back, thus forming a circular outer envelope of white silk. Inside this, a smaller flat envelope is spun, this time above and below the body of the larva. The outer envelope is from 5–8 mm. diameter; the inner, about 3 mm. Within this double cocoon the change to pupa takes place, and the adult escapes by a semi-circular slit in both envelopes.

Eggs laid.	Hatched.	Av. Temp.	1st moult.	2nd moult.	Cocoon.	Av. Temp.	Pupated.	Emerged	Av. Temp.
14/5/21	27/5/21	65° F.	30/5/21	6/6/21	16/6/21	63° F.	20/6/21	30/6/21	66° F.
28/7/20	10/8/20	65° F.	13/8/20	19/8/20	30/8/20	62° F.	4/4/21	27/4/21	51° F.

Above are typical life-histories. In the case of the second brood, the cocoon is spun in August or September, sometimes as early as July. The larva does not pupate, but remains in the cocoon throughout the whole winter. When warmer weather arrives the change to pupa takes place, followed by the appearance of the imago in about ten days to three weeks.

The principal food of *C. psociformis* on oak is *Phylloxera punctata* Licht., *Chionaspis salicis* L., and various mites, of which may be mentioned *Tetranychus quercinus* Berl.

On other trees it has been found preying upon Oribatids and *Bryobia praetiosa* K., and it was introduced to one pear tree, infected with the latter, with great success. Two species of Hymenopterous parasites have been bred from *C. psociformis*.

Conwentzia pineticola Enderlein.

Wing expanse 7–8 mm. This species is very similar to the last, though the pigmentation of the wing membrane is sometimes a little darker. It is distinguished from *psociformis* by the cross-vein in the fore-wings, from R_1 to Rs, striking the latter on the stem before the fork point. Also the antennae are shorter, averaging thirty joints.

I am extremely doubtful whether this is a good species, but up to the present have been unable to prove definitely to the contrary. The venational character is very variable; the number of antennal joints varies, and Enderlein himself quotes one example as having thirty-seven to thirty-eight joints. The male genitalia of the two forms appear to be identical. My own belief is that *pineticola* is a biological race, or at most a subspecies of *C. psociformis*. It is not my intention, in the present paper, to deal with the systematic side of the Neuroptera, but the following more striking intermediates between *psociformis* and *pineticola* are submitted in support of my contention that both are really one. The specimens cited are a few of several in my own collection.

(1) Wings typically *psociformis*, antennae 34-jointed, *i. e.* as *pineticola*. 1 ♂, cocoon taken, London, 30/10/20.

(2) Wings as *psociformis*, antennae 32-jointed, *i. e.* *pineticola*, ? sex, cocoon taken, Walthamstow, 9/10/20.

(3) Left wing as *psociformis*, right wing intermediate, antennae 34-jointed, *i. e.* as *pineticola*, ? sex, data as (2).

(4) Wings intermediate, antennae 35-jointed, ? sex, cocoon taken, London, 30/10/20, same tree as (1).

(5) Wings intermediate, antennae 37-jointed, 2 ♀♀ and 1 ♂, Heston Hounslow, 2/7/21.

Conwentzia pineticola occurs fairly commonly on plane trees in London. It has also been found on almond, cherry, plum, pear and conifers near London.

The early stages, eggs and larvae, are not distinguishable

from those of *C. psociformis*. The antennae of the larva are, however, shorter, being on the average ·4 mm. long. The ratio of basal joint to terminal portion is about 1 : 5. I am quite sure that this will not prove a reliable distinction, having already seen one larva of undoubted *psociformis*, which had been bred, with antennae no longer than as now given for *pineticola*.

The two forms of *Conwentzia* usually occur in separate localities, but their habits are in every way the same.

Coniopteryx pygmaea Enderlein.

Wing expanse about 5·5 mm.

Coniopteryx possesses an unbranched media in the hind-wings, and can thus be separated from all other British Coniopterygidae with subequal wings. In *C. pygmaea* the cross-veins between subcosta and radius, and radius and radial sector, in both wings, run in one straight line or almost so. While in *pygmaea* this venational character is remarkably constant and variations are few, yet *C. tineiformis* frequently has a very similar venation and might be confused with *pygmaea*. Other characters are given by Enderlein to separate the two species, but they are not as constant as one would wish, and I therefore omit them at present. *C. pygmaea* can best be determined by the male genitalia, which are very distinct. In the field, *pygmaea* may, after some experience, be identified with tolerable certainty by its smaller size and bright orange-pink colour of the abdomen, especially in the female. In *tineiformis* the abdomen is yellow in life.

A common little species in the south of England, where it is usually more abundant than *C. tineiformis* on conifers, to which it appears to be entirely confined. In a pine wood, year after year the species will abound on a particular tree or section of trees. Why, is a mystery, since the trees in question do not appear to possess food suitable for *Coniopteryx* which is absent from other trees. The first brood occurs in May and June, the second in July and August. Stragglers, both imagines and larvae, have been found as late as December.

Eggs are laid singly, rarely two or three together, on pine needles, on the inner flat face of same, sometimes at the base and but occasionally on twigs. They are ·4 mm.

long, of flattened oval shape, somewhat broader at the micropylar end, with a pointed micropylar cone. The colour is pinkish-orange when first laid, darkening slightly to brown at the end of a week. Hatching takes place in from one and a half to two weeks.

The young larva is ·6 mm. long, orange in colour, and but for the absence of food in the alimentary canal, which gives the darker central spot to the later larva, does not differ materially from the form of the third-instar larva. Owing probably to some peculiarity of diet, it has been found impossible to breed this species, but I do not think it can differ much from other Coniopterygidae. Full-fed larvae can be obtained by beating pines, throughout the summer.

Description of Third-instar Larva. (Plate XLIII, fig. 2.)

Length about 2 mm., shortly fusiform. Colour orange-brown with lateral white spots and a dark brown central spot, due to the contents of alimentary canal.

Head small and rounded, colour yellowish. Eyes reddish. Antennae colourless, short and two-jointed, the second joint about twice the length of the first. Palpi colourless, club-shaped.

Body colour orange-brown. Extending generally from the hind part of the prothorax to about the 2nd abdominal segment is a dark brown spot, varying somewhat in colour with the contents of the crop. The anterior part of the thorax is white, and there are two pairs of large white spots laterally in the thoracic region. The hind pair of these continues into the 1st abdominal segment. Two more white spots usually occur on each side of the mid-abdomen. It will be seen that all these markings are dependent on the colour of internal organs, and hardly, if at all, due to pigment in hypodermis or chitin, consequently they are liable to vary considerably, and it is therefore useful to find a structural character, which, so far, appears fairly constant for the genus *Coniopteryx*. At the extremity of the tarsus, projecting dorsally over the tarsal claws, are a pair of setae, conspicuously stronger than any others, curved slightly and ending bluntly, almost in a knob. In *Semidalis*, these setae are fine and curved, but not blunt ended, while in *Conwentzia* they are long and tapering. The legs are yellowish and translucent.

When full fed the larva spins a small, flat, white cocoon, of 2–3 mm. diameter, on the inner flat face of a pine needle, in the sheathing base of two needles, or anywhere

on the twigs and trunk. Eleven or twelve days after spinning, in a temperature of 70°–75° F., the imago appears.

It has been asserted that larvae of *Coniopteryx* found on conifers feed on *Chermes laricis*. Although I have found this aphid often present on the same tree as larvae of *Coniopteryx* I do not think the latter feed on *Chermes*, since, when offered this as food, the *Coniopteryx* larvae appear unable to deal with the waxy wool of the aphid, and often take little notice of *Chermes* unless denuded of wax. I can offer no definite alternative suggestion except that the many mites, eggs and young stages of Psocids, etc., found on conifers would probably form a more suitable food.

Coniopteryx tineiformis Curtis.

Wing expanse 6–7 mm.

Of larger size than *C. pygmaea* and more likely to be mistaken for *Semidalis* in the field, as the abdomen is generally more yellow and less red than that of *pygmaea*. The cross-veins from subcosta to radius and radius to radial sector are usually apart in both pairs of wings, and thus differ from those of *pygmaea*. Unfortunately this character is not always reliable, so that several other features have also to be taken into consideration with doubtful examples. If a male has been captured, there can be no doubt as to the specific determination, since the genitalia are most distinct.

Near London, *tineiformis* appears to be less common than *pygmaea*, and until this year I had taken very few on pine. More often the species occurs on oak and beech, also sallow, but never commonly, in my experience. Examples of the first brood may be found from the middle of May until early July, and of the second brood from mid-July until the end of August.

The eggs are yellowish-white in colour, ·45 mm. long, of flattened oval shape, with the usual pointed micropylar cone and reticulate chorion. They darken slightly as hatching approaches, which takes place in from one and a half to two weeks with a temperature averaging 65° F. When laid on leaves, such as those of oak, the position chosen is generally the edge of the leaf.

The young larva is ·7 mm. long, approximately, and pale yellow or whitish in colour. It will feed on the oak

Phylloxera in captivity and grows well at first, but in no case have I a complete record of the life-history. For some reason, feeding ceases before arriving at maturity and death ensues. This may be due to a fungoid disease which has been observed to attack larvae of *Conwentzia*. Larvae have been beaten from oak, beech and pine.

Description of Third-instar Larva. (Plate XLIII, fig. 3.)

Length when full fed 2·5 mm. Colour yellow, orange, or almost pale crimson. More elongate as a rule than *pygmaea* and approaching the form of a *Conwentzia* larva.

Head whitish; eyes dark crimson; antennae translucent and colourless, the distal portion three or four times the length of the basal joint. Palpi colourless.

Body somewhat fusiform, but broader anteriorly and tapering gradually to the anal extremity. Colour uniformly yellow, orange, or orange-crimson,—no markings. Legs pale yellowish, translucent.

The above description answers well for examples of *C. tineiformis* found on deciduous trees such as oak and beech. In the summer of this year, however, some larvae were taken on conifers, under the impression that they were fairly large specimens of *C. pygmaea*. These have since turned out to be *C. tineiformis*, and consequently the larvae of these two species of *Coniopteryx* (on pine) are not so distinct as I once thought. This is probably due to the difference in nature of the food, but it emphasises the desirability of finding structural characters on which to separate the larvae.

A small, flat, circular cocoon of white silk is spun for pupation, on the bark of trees, etc. The outer envelope is of about 3 mm. diameter and is attached to the inner envelope. Double structure is not marked. In about two weeks after spinning (65° F.) the imago appears. Winter is passed as a larva within the cocoon.

The food of this species, when on oak and other deciduous trees, probably does not differ from that of *Conwentzia psociformis*.

Semidalis aleurodiformis Stephens.

Wing expanse about 8 mm. The wings of *Semidalis* are subequal, the media in hind-wings is forked, which character separates from

Coniopteryx. In both pairs of wings the cross-vein between fore cubitus Cu_1 and media strikes the latter on the lower arm $M_3{}^+{}_4$ of fork. The abdomen in life is yellowish, often grey, due to scanty black pigment.

A common species in the south of England, but apparently rare in the north. Near London it is often abundant on oaks. The typical form and its variety *curtisiana* End. occur in about equal numbers. Less often it may be found on the following trees: hawthorn, crab-apple, pear, birch, alder, holly and rarely on pine. The first brood appears in May and June, and usually there is a second in July and August, though some of the progeny of the first brood often fail to emerge the same year, but pass the winter in the cocoon, appearing in May of the following year.

The eggs (Plate XLIII, fig. 13) are laid singly on the edges of leaves, as in the case of *Conwentzia*. They are ·5 mm. long, white in colour, with a reticulate chorion pointed at the micropylar end. Sometimes they are a little more elongate than are the eggs of *Conwentzia*, but otherwise it is difficult to draw any distinction. In about a week the egg becomes slightly greyish, and just before hatching the black patches on the embryo are distinctly visible through the chorion. In all cases observed, eggs hatched in about two or three weeks after oviposition. This appears to be an excessive length of time, but frequently with an average temperature of 60°–65° F., the incubation period has been three weeks. Another record gives twelve days at 70° F.

The young larva, length ·7–·8 mm., is marked in black and white on the body in exactly the same way as the later larva, so that identification is easy in all stages. The head at first is larger, and the legs longer in proportion to the body than is the case after some days of feeding.

Description of Third-instar Larva. (Plate XLIII, fig. 4.)

Length 2–2·5 mm. when full fed. Short spindle-shaped, conspicuously marked in black and white. Head small, colour dark grey, projecting cone of mouth-parts almost black at apex. Eyes bright red or crimson. Antennae fairly short, greyish. Palpi greyish, translucent.

The body is most easily described as a whole, but it is difficult to give in a description an adequate idea of the real appearance. The ground-colour is white. There are two black, diamond-shaped markings, one mainly on the thorax, the other abdominal and some-

what smaller. The vicinity of the middle line is white. The two black, diamond marks are in contact and so leave laterally, in pro- and mesothorax, also in fore and hind abdomen, white patches. The remaining few small hind segments of the abdomen are whitish, with central blackish markings. The last two segments are colourless and transparent. There is a median longitudinal dark crimson line, starting about the mesothorax and running almost to the tip of the abdomen. The underside of the body is greyish-white marked with black, and where the dorsal markings reach well down the sides they generally continue partly across the venter. Legs greyish, translucent.

All black markings mentioned above are due to hypodermal blue-black pigment, which appears as such in the early part of each instar, but later in the instar tends to become dark brown.

For pupation a small flat cocoon of white silk is spun, on a twig or in a crevice. The cocoon does not show the double structure as well as does that of *Conwentzia*, and is not truly double. The larva first spins above and below itself a silken covering of 3–4 mm. diameter. Then a ring of silk, 2 mm. diameter, is spun connecting together the upper and lower silk surfaces. The change to pupa takes place in about four days, and a week later the imago appears, after biting a semicircular slit in the silken envelope with its pupal mandibles. In the case of larvae from the second brood, the winter is passed as a larva within the cocoon and pupation occurs in spring.

Eggs laid.	Hatched.	Av. Temp.	1st moult.	2nd moult.	Cocoon.	Av. Temp.	Pupated.	Emerged.
20/6/22	8/7/22	62° F.	13/7/22	20/7/22	8/8/22	63° F.	12/8/22	20/8/22
21/6/22	12/7/22	62° F.	15/7/22	21/7/22	10/8/22	63° F.	Will emerge next year.	

The two examples in the table have been selected, as they give a variation in life-cycle of two specimens from eggs laid almost simultaneously. The backward season and cold weather probably account for the second case of a first-brood larva hibernating.

The food of *Semidalis*, larvae and adults on oak, appears to be often *Phylloxera punctata* Licht., and this is the easiest food on which to breed them in captivity as they do not take kindly to aphids, as a rule. Also on oak they

have been seen feeding on *Chionaspis salicis* L. They can be fed on red spider, and on pear trees larvae have been found preying upon *Bryobia praetiosa* K., once on gooseberry on the same mite.

Enderlein (4) describes *S. curtisiana* End. as a species distinct from *S. aleurodiformis* Steph., but I have already shown this to be merely a variety (14). *S. aleurodiformis* and *curtisiana* have both been bred, together with intermediate forms, from the eggs of one female. In nature both forms occur together in approximately equal numbers.

Parasemidalis annae Enderlein.

Wing expanse 5–6 mm.

This species was first taken in June, 1922, at Oxshott (14), it then being new to Britain. It somewhat resembles *Coniopteryx* in size and form, but is decidedly blackish, with a very sparse waxy coating. The media in hind-wings is forked. Cross-vein from Cu_1 to media strikes the latter on the stem before fork point in both wings.

The species occurs on conifers sparsely with *C. pygmaea*.

Eggs (Plate XLIII, figs. 9 and 10) are laid attached by their flat sides. They are of typical Coniopterygid pattern, but rather short and broad. The micropylar cone is drawn slightly upwards. Length ·4 mm., colour white when laid.

I have failed to rear, or even to find the larvae after hatching. Fresh opportunities are hoped for next year.

Helicoconis lutea Wallengren.

Wing expanse 8 mm.

Although I have not taken this species personally, for the sake of greater completeness a brief notice of the type of larva may be of interest.

The imago differs from all our other Coniopterygidae in that it possesses paired eversible ventral sacs on abdominal segments 1–5, there being also a rudimentary pair on segment 6; the external lobe of the maxilla is three-jointed (one joint in Coniopteryginae); and the wing venation differs in many respects.

The species was first discovered in Britain in July 1915, by J. W. H. Harrison (6), several specimens having been taken on larch and birch at Wolsingham, Co. Durham.

The larva of *Aleuropteryx loewi* Klap. was described by Löw in 1885 (8). This is very nearly allied to the present species, and will no doubt be found similar, if indeed *A. loewi* does not also occur in Britain. The body is of usual Coniopterygid shape, white, with two dark violet bands running latero-dorsally. The jaws are relatively much longer than those of Coniopteryginae, being needle-shaped and not covered by the upper lip. The terminal joint of the labial palpus is not club-shaped, but longer and cylindrical. Larvae were found on *Pinus mughus* in Vienna feeding upon *Aspidiotis abietis* Schrk. and *Leucaspis pini* Htg.

Food of Neuroptera.

Imagines feed on any sweet matter, honeydew, etc., and also on aphids or similar small insects. Some are sufficiently carnivorous to devour one another, when hungry.

The larvae of terrestrial forms feed upon plant lice, etc., but few small insects come amiss, except in some cases where waxy aphids are not taken, due to the fact that the wax clogs the spiracles of the larva and in other ways inconveniences it. The waxy resin poured out from the cornicles of an aphid when seized does not appear to be of avail against a *Chrysopa* larva, the head of which is often found to be smothered with this substance.

The larvae feed continuously during warm weather, the amount of food taken per diem depending on the temperature and the state of the larva. Food is taken increasingly until, a day or so before moulting, the larva rests without feeding. Some hours after the moult, feeding is recommenced and again reaches a maximum, then dropping just before the next moult or before spinning, as the case may be. Such is the result from the observation of larvae supplied daily with an excess of standard-size aphid. The size chosen was that of a full-grown stem mother of *Aphis rumicis* L. To demonstrate the results properly would require a graph for each specimen, giving temperature as well as the number of aphids eaten. As this would perhaps be out of place here, it may be best to give only some totals. A larva of *H. nitidulus* from hatching until spinning its cocoon 23 days after, in June, consumed 79 aphids. Six larvae of *C. vulgaris* during active life of 23 to 25 days, in June, consumed from 111 to 142 aphids each. On the

other hand, larvae of *C. septempunctata* also supplied with excess of food, have been observed to pupate on as few as 71 and 91 aphids respectively. A fair average in the case of *Chrysopa* is 100. With Coniopterygids the amount of food taken is not so easy to determine, and the larva when feeding often does not suck its prey at all completely. Oak leaves covered with ova, and newly-hatched *Phylloxera punctata* Licht., were given to *Conwentzia* and *Semidalis* larvae. The number of both ova and young destroyed during the life of the larva, about three weeks, must have been between 150 and 300.

Checks and Parasites.

A gram-positive *Micrococcus*, of about 1μ diameter, causes a disease in larvae similar to flacherie. The bacterium obtains entry to the body via the anus, which, as has been previously noted, often exudes a drop of viscous adhaesive fluid. The larva turns black and dies. This disease is very infectious and boxes have to be sterilised before use for another larva. The disease is rarely met with in nature.

Larvae of *Chrysopa prasina* and *ventralis*, and some larvae wintering in the cocoon, die, and later give rise to a growth of *Penicillium* sp. I have not yet proved that the fungus is the cause of death or whether it is only saprophytic.

Imagines of *H. stigma*, especially late in the season, may be infested with a cephaline gregarine parasite, in the mid- and hind-gut. Uninfected imagines placed in a box in which infected specimens have lived become also infected, and I have good reason to believe that this is by eating the infected excreta, since imagines have often been observed to eat each other's excrement. Infection in wild caught insects in autumn is often as high as 50 per cent. in some districts. Little harm appears to be done by the parasite, infected females continue to lay fertile eggs.

Hymenopterous parasites attack all stages except the imago. *Sisyra* and *Conwentzia* are attacked while as larvae awaiting pupation within the cocoon. Thus *Lygocerus* sp. bites a hole in the cocoon of *C. psociformis*, with its mandibles, then often bites or bruises the *Conwentzia* larva on the thorax, probably to prevent pupation, and finally lays an egg beside the larva. The parasitic larva

devours its host, and later emerges, or, if in autumn, it winters as a larva, pupating and emerging in spring. The following Hymenopterous parasites have been found.

Hemerobius micans
Anacharis typica Wlk.
H. lutescens
Anacharis typica Wlk.
H. stigma
Anacharis ensifer Wlk.
From cocoon of *H. stigma*
Gelis ruficornis Thbg.
Chrysopa flava
Helorus coruscus Halid.
Hemiteles aestivalis Grav.
C. alba
Helorus coruscus Halid.
C. septempunctata
Helorus rugosus Thoms. (C. G.)
From Chrysopid cocoons under oak bark
Mesochorus pectoralis Ratz.
Conwentzia psociformis
Lygocerus sp.
Calliceras (*Ceraphron*) sp.
From *Conwentzia* cocoon
Rhizarcha senilis Nees.

More details of the parasites bred out must appear later, as many require separate treatment.

Neuropterous larvae are preyed upon by many predacious insects. *Conwentzia* larvae, as they swarm on the tree-trunks previous to spinning, are killed in large numbers by Chrysopid and Coccinellid larvae, and even when within the cocoon, a *Chrysopa* larva will often suck the resting larva or pupa.

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Explanation of Plates XXXVIII–XLIII.

PLATE XXXVIII.

Sisyridae and Osmylidae.

Fig. 1. Egg-breaker of *Sisyra fuscata* × 400.
2. *Sisyra fuscata* larva full fed.
3. „ „ „ newly hatched × 48.
4. *Osmylus chrysops* larva full fed.
5. Head of same, underside, to show jaws as broken before pupation.
6. Eggs of *Osmylus* × 7·2.
7. Egg-breaker of *Osmylus* × 166.
8. *Osmylus* ♂, "calling."
9. „ ♂, viscera from side. Six Malpighian tubes omitted.
10. „ testis and vesiculae seminales.
11. *Osmylus* ♀, apex of abdomen, with spermatophore, from side.

PLATE XXXIX.

NEUROPTERA (ANATOMY, ETC.)

FIG. 1. Head of *Nothochrysa capitata* larva, immediately after breaking of amnion skin, in hatching.
2. *N. capitata*, egg about to hatch × 15.
3. ,, later, just before splitting of amnion.
4. ,, larva nearly free.
5. *Chrysopa septempunctata* larva, alimentary canal. Four of six looped Malpighian tubes omitted.
6. *Hemerobius humuli* ♀, alimentary canal. Four of six looped Malpighian tubes omitted.
7. *Chrysopa perla* ♀, alimentary canal, etc. Four of six looped Malpighian tubes omitted.
8. *N. capitata* ♀, reproductive organs.
9. Salivary glands of *Sisyra fuscata* ♀.
10. ,, ,, *C. septempunctata.*
11. ,, ,, *C. perla.*
12. Testis of *C. flava.*
13. ,, *C. perla.*
14. ,, *N. capitata.*
15. ,, *C. prasina.*
16. Cement gland of *Sisyra fuscata* ♀.
17. ,, ,, *Micromus paganus* ♀.

PLATE XL.

HEMEROBIIDAE.

FIG. 1. Third-instar larva of *Sympherobius pygmaeus.*
2. ,, ,, ,, *Hemerobius micans.*
3. ,, ,, ,, *H. nitidulus.*
4. ,, ,, ,, *H. humuli.*
5. ,, ,, ,, *H. stigma.*
6. ,, ,, ,, *Boriomyia subnebulosa.*
7. ,, ,, ,, *B. concinna.*
8. ,, ,, ,, *Micromus paganus.*
9. Egg-breaker of *S. pygmaeus* × 166.
10. ,, ,, *H. lutescens* × 166.
11. ,, ,, *M. paganus* × 166.
12. Egg of *Hemerobius* × 28.
13. ,, *B. concinna* × 23.
14. ,, *M. paganus* × 25.

PLATE XLI.

CHRYSOPIDAE.

FIG. 1. Third-instar larva of *Chrysopa flava.*
2. ,, ,, ,, *C. vulgaris.*
3. ,, ,, ,, *C. tenella.*
4. ,, ,, ,, *C. alba.*
5. ,, ,, ,, *C. flavifrons.*
6. ,, ,, ,, *C. prasina.*

PLATE XLII.

Chrysopidae.

Fig. 1. Third-instar larva of *Chrysopa ventralis.*
2. ,, ,, ,, *C. septempunctata.*
3. ,, ,, ,, *C. perla.*
4. Head of third-instar larva of *C. dorsalis.*
5. Third-instar larva of *Nothochrysa capitata.*
6. Eggs of *C. flava.*
7. ,, *C. prasina* (rather closely laid).
8. Egg of *C. tenella.*
9. Egg-breaker of *C. flavifrons* × 166.
10. Egg of *N. capitata.*
11. Egg-breaker of *N. capitata* × 166.

PLATE XLIII.

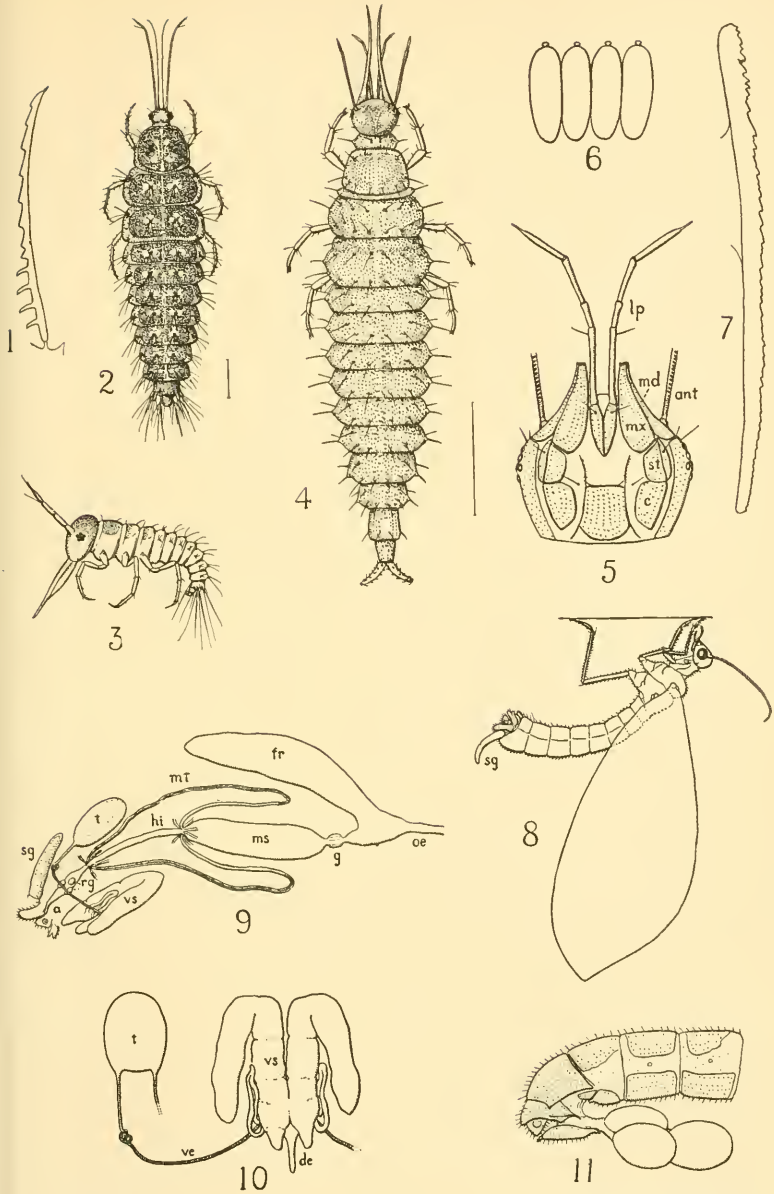
Coniopterygidae.

Fig. 1. Third-instar larva of *Conwentzia psociformis.*
2. ,, ,, ,, *Coniopteryx pygmaea.*
3. ,, ,, ,, *C. tineiformis.*
4. ,, ,, ,, *Semidalis aleurodiformis.*
5. Alimentary canal of *C. psociformis* larva.
6. Nerve chain of ,, ,, ,,
7. Head of *C. psociformis* larva from below.
8. Egg-breaker of *Semidalis aleurodiformis* × 400.
9. Egg of *Parasemidalis,* (dorsal) × 36.
10. ,, ,, ,, (lateral) × 36.
11. Imago (♀) of *C. psociformis* to show sclerites and wax-gland areas.
12. Pupa of *C. psociformis.*
13. Egg of *Semidalis* × 45.

LETTERING.

a, anus; *abg*, abdominal ganglia; *ag*, accessory gland; *ant*, antenna; *br*, brain; *c*, cardo; *cg*, cement gland; *cl*, clypeus; *de*, ductus ejaculatorius; *ebr*, egg-breaker; *fi*, fore intestine (stomodeum); *fr*, food reservoir; *g*, gizzard; *hi*, hind intestine (proctodeum); *lbr*, labrum; *lp*, labial palpus; *md*, mandible; *ms*, mid intestine (mesenteron); *mt*, Malpighian tubes; *mx*, maxilla; *oe*, oesophagus; *ov*, ovary; *pm*, peritrophic membrane; *rg*, rectal glands; *sg*, scent gland; *slg*, salivary gland; *sog*, sub-oesophageal ganglion; *sp*, spermatheca; *sr*, silk reservoir; *st*, stipes; *t*, testis; *thg*, thoracic ganglia; *ve*, vas efferens; *vs*, vesiculae seminales; *wg*, wax-glands.

February 17th, 1923.



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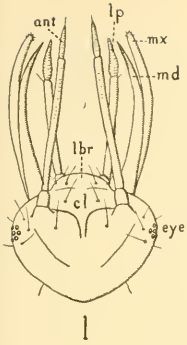
SISYRIDAE and OSMYLIDAE.



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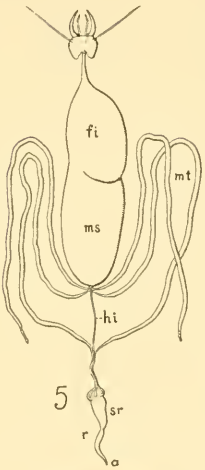

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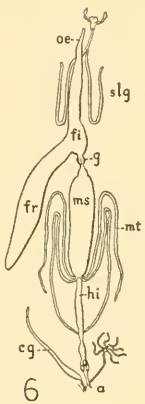

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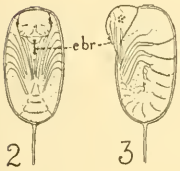

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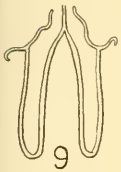

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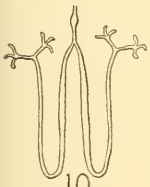

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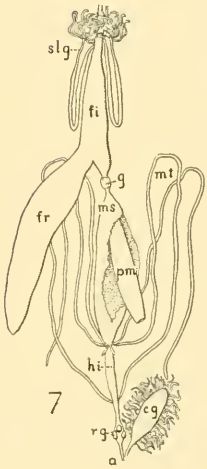

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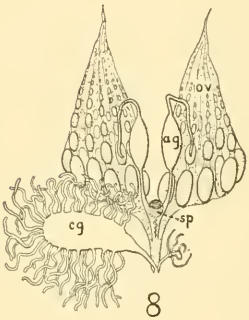

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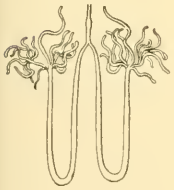

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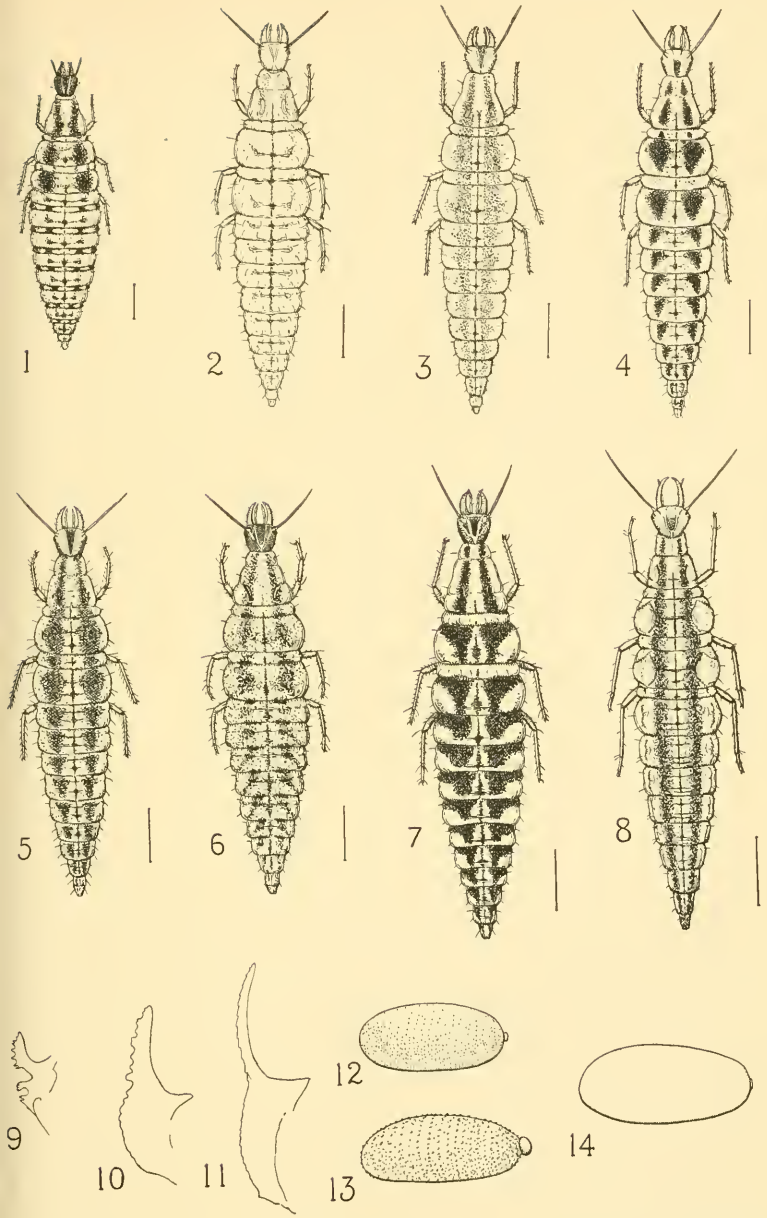
NEUROPTERA (Anatomy, etc.).



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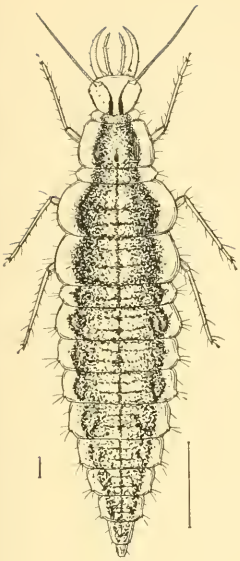
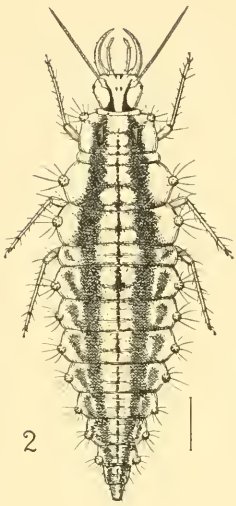
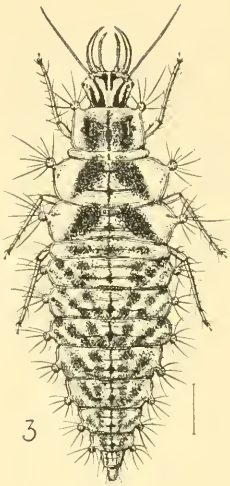
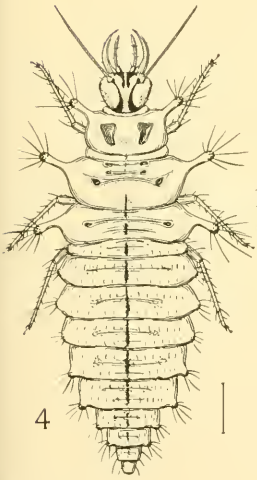
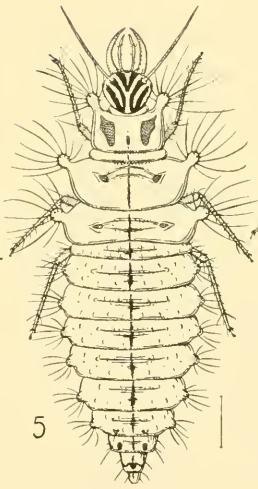
HEMEROBIIDAE.

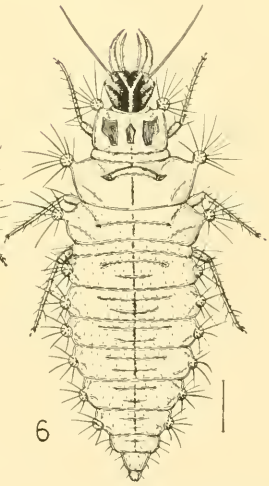






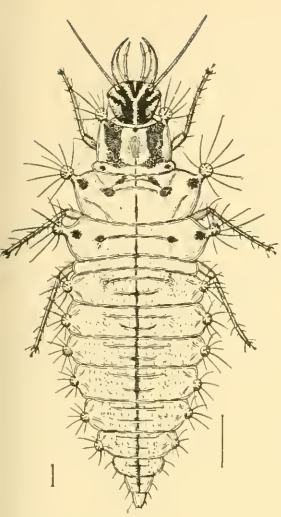


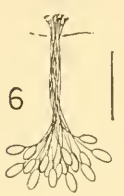


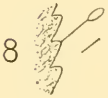


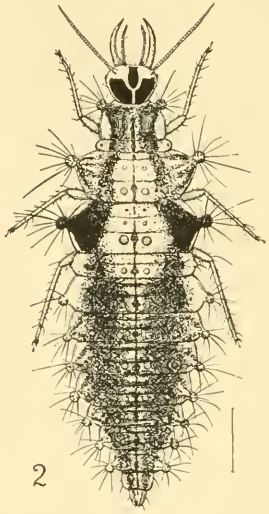
C. L. W. del. *Vaus & Crampton.*

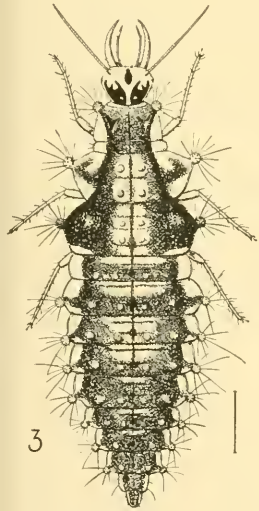
CHRYSOPIDAE.

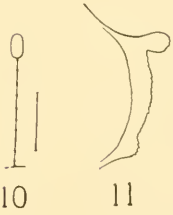


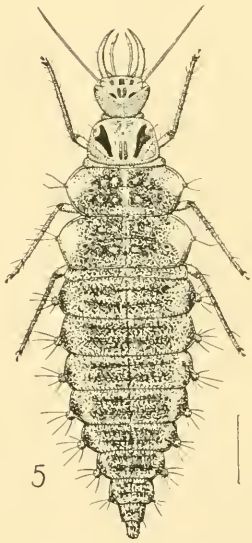












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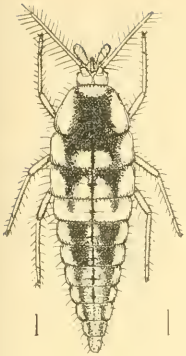
CHRYSOPIDAE.



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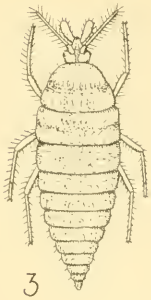

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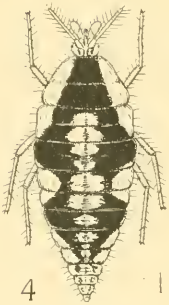

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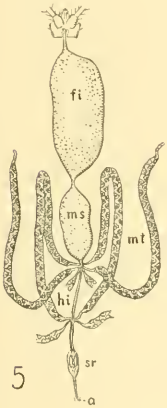

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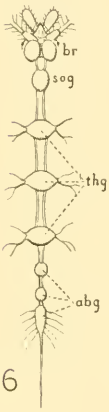

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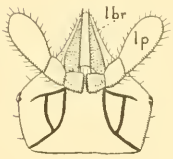

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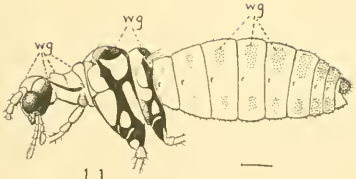

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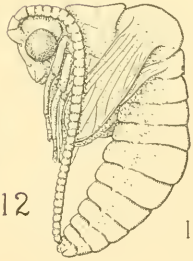

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C. L. W. del. *Vaus & Crampton.*

CONIOPTERYGIDAE.

THE ENTOMOLOGICAL SOCIETY OF LONDON

THE FELLOWSHIP AND FEES.

Fellows pay an Admission Fee of £3 3*s*. The Annual Contribution of £2 2*s*. is due on the first day of January in each year, and is payable in advance.

All Fees should be paid to the Treasurer, Mr. W. G. Sheldon, at 41, Queen's Gate, S.W. 7, and *not to the Secretaries*.

Fellows desiring to pay their Annual Contribution through their bankers can obtain an official form of banker's order by applying to the Treasurer.

Fellows whose Contributions for the current year have been paid are entitled to receive the publications of the Society free of charge. Further copies may be purchased at reduced prices by applying to the Librarian.

Forms of application for Fellowship, copies of the Bye-laws and the List of Fellows may be obtained from the Secretaries.

MEETINGS AND EXHIBITIONS.

Intending exhibitors are required to send in their names and the nature of their exhibits to the Secretaries *before noon* on the day of the meeting, in order that they may be called upon from the chair. Descriptive notes of all exhibits should be handed to the Secretaries *at the same meeting* for printing in the Proceedings. If the lantern is required, a week's notice must be given.

Fellows resident abroad, or who are otherwise unable to attend, are reminded that any specimens, notes, or observations they may send to the Secretaries will be considered by the Council, with a view to exhibition or reading at the meetings of the Society.

PAPERS AND ILLUSTRATIONS.

Fellows desiring to communicate papers to the Society must send the manuscript of such papers to the Transactions Secretary, Dr. H. Eltringham, Woodhouse, Stroud, Gloucestershire, at least fourteen days prior to the date of the meeting at which it is proposed that such papers shall be read. Authors desiring their papers to be published in the Transactions must submit the manuscript, and proposals for illustrations, if any, to the Transactions Secretary at least fourteen days before the meeting of the Publication Committee at which it is desired such papers should be considered.

Authors proposing to illustrate their papers should communicate with the Secretaries before the drawings are executed. The Council recommend that the size of the finished work on plates should be limited to 6¼ ins. by 4 ins., and in no case will it be allowed to exceed 6½ ins. by 4¼ ins.

Attention is called to the Instructions to Authors issued with Part I of each volume, which may also be obtained at the Office of the Society. Inattention to these regulations may involve an author in considerable expense.

WANTED.

The Society is willing to purchase volumes or parts of the Transactions for the years 1907, 1908, and 1912.

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41, QUEEN'S GATE, S.W. 7

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PRINTED FOR THE SOCIETY BY RICHARD CLAY AND SONS, LIMITED, BUNGAY, SUFFOLK.

PART V. May 5, 1923.

THE

TRANSACTIONS

OF THE

ENTOMOLOGICAL SOCIETY

OF

LONDON

1922.

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Some of the early volumes of the Society's Transactions are out of print, but those which are in stock can be obtained at reduced prices. Any single volume of the present series, 1868–1887, is sold at 10*s.* to Fellows. The volumes for 1868–1890, in sets of not less than five, as well as the five of the Third Series (1862–1867), can be obtained by Fellows at greatly reduced prices on application to the Librarian. The following is a price list of recently published parts of the TRANSACTIONS—

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THE

PROCEEDINGS

OF THE

ENTOMOLOGICAL SOCIETY

OF

LONDON

1922.

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1922–1923.

THE

PROCEEDINGS

OF THE

ENTOMOLOGICAL SOCIETY

OF

LONDON

FOR THE YEAR 1922.

Wednesday, February 1st, 1922.

The Rt. Hon. Lord ROTHSCHILD, F.R.S., etc., President, in the Chair.

Vice-Presidents.

The PRESIDENT announced the Vice-Presidents for the ensuing year to be Mr. R. ADKIN, Mr. E. C. BEDWELL, and Prof. E. B. POULTON, D.Sc., F.R.S., etc.

Obituary.

The TREASURER read a letter from the Hon. N. C. ROTHSCHILD announcing the death of Mr. W. PURDEY of Thanet Gardens, Folkestone, and a vote of condolence was passed to his relatives.

The Rev. F. D. MORICE also gave a short account of the life of the late Mr. F. W. L. SLADEN.

Election of Fellows.

The following were elected Fellows of the Society:—Dr. R. E. MCCONNELL, Arua, Uganda; Dr. H. T. FERNALD, Ph.D., Professor of Entomology, Massachusetts Agricultural College, Amherst, Mass., U.S.A.; and Dr. ALFRED MOORE, M.D., 31, Alfred Place, South Kensington.

Exhibits.

The PRESIDENT, Mr. SHELDON, and Mr. ADKIN all brought for exhibition some remarkable series of *Cidaria truncata*, *C. citrata* and *C. concinnata*.

A BRITISH SAWFLY.—The Rev. F. D. MORICE made the following communication.

On July 21, 1921 I received from Miss E. Chawner, F.E.S., some cocoons formed by larvae of *Pristiphora pallipes* Lep., one of several sawflies which are specially attached to the gooseberry. She had obtained them from eggs laid in captivity on leaves of the food-plant by an unfertilised ♀, so that the whole brood was "parthenogenetic." From some of these cocoons imagines—all ♀♀—emerged during their journey from Lyndhurst to Woking. I placed them at once with some cuttings from my own gooseberry bushes in a glass-covered tin, and very soon saw them beginning to lay eggs. Six days later (July 27) the eggs had produced young larvae, which fed up very rapidly, and by Aug. 7 had almost all spun up either at the bottom of the tin or between leaves of the food-plant. In 6 more days, viz. on Aug. 13, imagines (again all ♀♀) began to issue from the cocoons, and lay eggs, from which I obtained another lot of larvae, which may or may not produce imagines next spring.

Hartig has estimated the average duration of a sawfly's life from leaving the egg to emergence as an imago as follows :—

1½ to 2 months from leaving the egg to forming the cocoon,

10 days to 3 years from forming the cocoon to pupation,

8 to 14 days from pupation to emergence.

I cannot find that he gives any figures about the time spent in the egg-stage. But leaving this out of account, it would seem that on his estimate the *minimum* time which the development of my insects from egg to imago ought to have occupied would be 63 days and the *maximum* 1,169 days. The time which it actually took, exclusive of 6 days spent by them as eggs, was 11 days as larvae feeding, and 6 in the cocoon—17 days in all !

I suppose that this extraordinary hastening of the process was connected in some way with the exceptional heat and drought of last summer. But I do not think that these conditions can

have been favourable to the development of sawflies generally. Out of doors, in their natural habitats, it has seemed to me that all through last year both larvae and imagines of sawflies were very much less abundant than usual. I often walked many miles without finding a single specimen on plants which usually produce them in quantities.

It would interest me to know whether Fellows who have been rearing larvae of the same or other Orders have had any experiences at all similar to my own.

Aberrations of British Lepidoptera.—Mr. H. J. Turner exhibited on behalf of Mr. Thos. Greer, of Stewartstown, Co. Tyrone, the following series of aberrations of British Lepidoptera.

Euchloë cardamines. (1) ♂ ab. *marginata.* (2) ♂ With the orange blotch streaked with black scaling. (3) ♂ Small form. (4) ♂ Large form. (5) ♀ ab. *radiata.* (6) ♀ With slight orange streaks on the R. fore-wing above and below.

Melitaea aurinia. ♀ Dull obscure form.

Pararge megera. (1) ♂ With apical ocellus reduced to a small dot. (2) ♂ With ocellus of fore-wing apex duplicated, and with the four fascia of the costa reduced to two.

Polyommatus icarus. (1) Gynandromorph: R. side ♀, L. side ♂. (2) ♂ With faint red marginal markings on hind-wings above, ab. *icarinus* below. (3) ♀ With marginal red spots extended and band-like.

All the specimens were from Co. Tyrone.

Mr. Ashby exhibited some butterflies from Piedmont and said that he considered the Val di Bartelemi, close to Nus, to be one of the best collecting-grounds in Northern Italy.

Mr. J. H. Durrant, on behalf of Dr. Gahan, exhibited some living examples of the Cassid beetle, *Aspidomorpha sanctae-crucis*, from India; the causes of the brilliant metallic coloration of this beetle were discussed by Mr. Arrow and by Mr. Willoughby Ellis, and Dr. Neave commented on the habits of similar species in Africa.

Paper.

The following paper was read:

"Two new British species of *Hydroptila*," by Martin E. Mosely.

Wednesday, March 1st, 1922.

The Rt. Hon. Lord Rothschild, F.R.S., etc., President, in the Chair.

Election of Fellows.

The following were elected Fellows of the Society :—Mrs. Margaret Rae, Courthill, Birkenhead; Dr. A. F. Rosa, M.D., 28, Pitt St., Edinburgh; Mr. Frank Russell, F.G.S., Auldam House, Worksop; and Captain Francis Moysey, Suffolk Regiment, attached Soudanese Battalion (Egyptian Army), Talodi, Nuba Mountains, Sudan.

Wicken Fen Fund.

The Treasurer made a statement on the Wicken Fen Fund. He called attention to the valuable work that is being done on this nature reserve, and made an appeal for contributions towards its maintenance.

Bequest to the Society.

The Treasurer announced that the late Mr. G. A. J. Rothney had bequeathed the sum of £150 to the Society.

Obituary.

The President announced the death of Professor Geldart, and a vote of condolence with his relatives was passed.

Exhibits.

An Imported Bee in Britain.—Dr. J. Waterston exhibited an example of *Melipona scutellaris* Latr., taken on a flower head on Black Cliffs, Brighton, in July 1921, by Mr. Brazenor, and said that this bee, which in the present instance could only be a casual immigrant, is a native of Brazil.

Dr. Waterston also exhibited a portion of a reed stem of *Arundo phragmites* in which a Lepidopterous larvae, *Nonagria dissoluta*, had been burrowing. This stem (fig. 1) presented a curious tuberculate appearance caused by the emergence at numerous points of the pupae of a Chalcid, *Geniocerus flavimanus* Thoms.

Butterflies from the Nile.—Mr. H. Mace exhibited a number of species of butterflies from the neighbourhood of Khartoum in illustration of his paper in the Transactions.

A new Variety of Diaphora mendica.—Mr. Robert Adkin exhibited specimens of *Diaphora mendica* from Co. Tyrone, Ireland, for which he proposed the varietal name *venosa*. This local race most nearly approaches that known as *rustica* (of which a series of Co. Cork specimens was exhibited

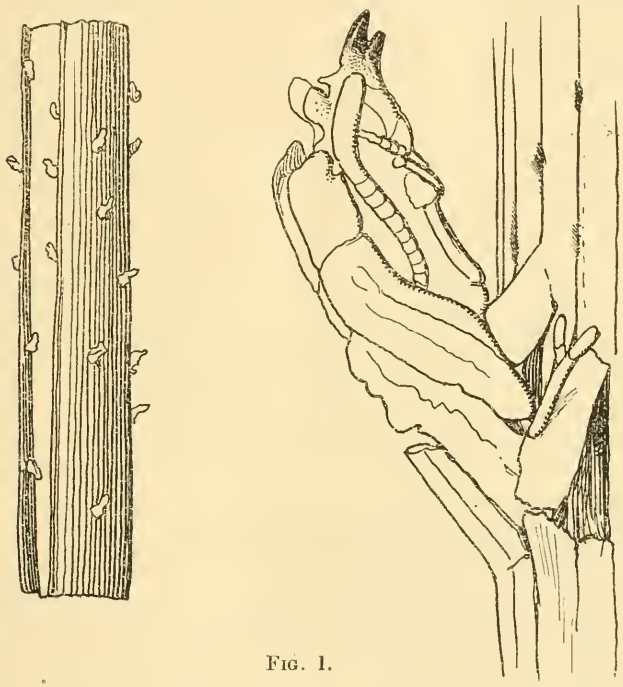


Fig. 1.

for comparison) of all the known forms of the species, but differs from it in the whitish-grey colour of the wings in both sexes and the darker grey of the veins, which in many of the specimens is very distinct. In the darker males (for as in var. *rustica* they vary in depth of colour) the tone is of a grey-brown as compared with the yellowish-brown of the latter form.

Insects from Piedmont.—Mr. E. B. Ashby brought for exhibition numerous insects of various Orders taken in Piedmont, Italy, from July 25 to August 16, 1921.

The utilisation of derived plant-pigments in the colouring of Lepidoptera.—Prof. Poulton drew attention to a paper on "Blue-Green Caterpillars," published November 1921, in the "Journal of Experimental Zoology" (Vol. 34, No. 3, p. 385), by John H. Gerould, Dartmouth College, New Hampshire. In the course of the author's breeding experiments, on *Colias philodice* Godt. about 45 blue-green caterpillars * appeared among about three times as many of the usual yellowish grass-green colour. Corresponding differences were seen in the pupae and in the eyes of the imago. The eggs laid by a female with blue-green blood (haemolymph) and eyes were pure white as compared with the normal cream-white. The empty pupal shell was pure white as compared with golden yellow. The cocoons of a Braconid parasite (*Apanteles flaviconchae* Riley) were pure white when the host was blue-green, bright yellow when it was yellow-green.

The interpretation was found in the fact that the blue-green caterpillars were unable to utilise the yellow constituent (xanthophyll) of the green colouring-matter of their food-plant (clover), but utilised the blue-green constituent (chlorophyll), while normal caterpillars utilised both. These derived pigments, present in a modified state in the blood or in the tissues or in both, accounted for the above-mentioned colours in the different stages, the yellow constituent being especially penetrating and especially persistent, for it alone reached the cuticle and it alone appeared in the Braconid cocoons.

The author also proved that the bluish tint is a Mendelian recessive and the yellowish dominant, but for the convincing evidence and many interesting details the paper must be consulted. A copy, by the author's kindness, has been presented to the Society.

In a later paper, read at the recent meeting of the American Assoc. for the Adv. of Sci. at Toronto, and kindly sent to Prof. Poulton in typescript, Mr. Gerould described an olive-green form of the same larva, recessive, like the blue-green, to the yellow-green. The olive-green effect was due to the pigment in the hypodermal cells, the blood being indistinguishable from that of the

* The blue-green caterpillars were also entirely without the pink line running along the centre of the spiracular white band.

yellowish larvae. The imaginal eye was also olive-green but of a paler shade than that of the larva. Although the blood appeared similar to that of the yellowish-green larvae, physico-chemical differences were probable—accounting for the changed colour of the hypodermis and the orange-yellow hue of the scale pigments on the under surface of the H.W. and tip of F.W.—parts most exposed during pupal development to the action of the blood.

The utilisation of derived plant-pigments in different ways by different individuals had been proved, not only in species like the above in which the power and its manifestation were hereditary and doubtless germinal in origin, but in species in which it was called forth as a response to stimulus. And in the latter the persistence of the pigments was as great as in the former. Indeed, in an example demonstrated 35 years ago the derived colour of a caterpillar, determined by the tint of the leaves of its food-plant, passed on into the young caterpillars of the next generation. As the record of this result is brief and not very accessible to Entomologists, it has been thought well to reprint it from the Proceedings of the Physiological Society at Oxford on July 2, 1887 ("Journ. Physiol.," VIII, pp. xxv, xxvi) :—

"3. Mr. E. B. Poulton exhibited some ova of *Smerinthus ocellatus* and of *S. populi*, and some young larvae of the former species.

"The colour of the ova in both species was shown to correspond with that of the larval stage of the female moth which laid the eggs; and the young larvae are also similarly tinged immediately after hatching, although their subsequent appearance is known to be determined by their coloured surroundings. The colour of the eggs and newly-hatched larvae appears to strictly follow that of the female parent, and a similar correspondence was witnessed in the unfertile ova laid by unimpregnated females.

"These observations render it probable that the chlorophylloid pigments persist throughout all the stages of one ontogeny and are then handed down to the earliest stage of the next. . . ."

Now that this interesting subject was again being studied it

might be worth while to call attention to a note in our Transactions for 1886 (pp. 168–70) which, intermingled with notes on various other subjects, was likely to be overlooked. It was there shown that the opaque green colour of the larva of *Smerinthus ocellatus* was entirely due to the derived pigments stored in the hypodermis cells, the blood being only very faintly tinged. "Before pupation the pigments are withdrawn from the cells, and are dissolved in the (pupal) blood, which therefore possesses a concentrated solution of all the pigments that have passed through this medium during the whole of larval life. . . ."

Prof. Poulton took the opportunity of bringing before the Society Mr. Gerould's kind offer to give the benefit of his experience to English entomologists. He wrote on Jan. 21, 1922:—

"*Colias* is very favourable for a physiological analysis of heredity because we know already something about its pigments and can study them spectroscopically and experimentally.

"It is a curious thing regarding melanism in *Colias* that, while the chemical reaction that produces it is subject to seasonal control and appears in all winter individuals, certain members of the summer brood (cf. 'mutations' of *betularia*) show it, from one of which I now have a few descendants in hibernation. I take it that the chemical reaction is identical, whether brought out by cold or by chromosomal action.

"If any English entomologist will undertake to breed *C. edusa helice* I shall be glad to give him the advantage of my experience during the last dozen years with our white variety. Lethal factors or some disturbing causes have given me some interesting though puzzling data, upon which I am now working. *Helice*, I imagine, from what Harrison and Main published, may be more orthodox."

The late Dr. T. A. Chapman on germinal "factors" and their independent existence and development.—Prof. Poulton said that Mr. J. H. Gerould in the paper referred to above spoke of the sudden appearance of the blue-green caterpillars as a "new mutation," at once recalling to his mind the opinion he had heard expressed at our meetings by the late Dr. T. A. Chapman, F.R.S., that such sudden

appearances are not really new, but due to the reappearance of extremely ancient and, as it were, " buried " characters. This was also Mr. Gerould's opinion, for he wrote in the letter of which part has been already quoted :—

" ' New ' mutations in my dialect are merely inheritable discontinuous variations, *new to science*. I agree with you entirely as regarding the two (blue-green and olive-green) as ' buried recessive characters ' brought to light by inbreeding. Many of the mutants of *Drosophila* are of this sort. Geneticists, it seems to me, are coming to use the term mutation without reference to the time when the process behind it first occurred, and in a sense quite different from that used by De Vries. I believe that such intensive inbreeding of almost any insect as has been employed with *Drosophila* will bring out a similar array of ' mutations.'

" My olive-green strain probably came from a male imported from N.Y., close to the range of *eurytheme* [Boisd.]. It may well be the ' revival of an ancient character,' of which you speak, derived from that wide-spread species from which *philodice*, I think, has sprung."

On Nov. 29, 1921, shortly before his death, Dr. Chapman wrote to Prof. Poulton on the same subject, enclosing a statement of his views on " factors," thus referred to in the accompanying letter :—

" I have been turning over in my mind for some years an idea concerning ' factors,' that I am afraid I shall never have time or energy to follow up more fully. I have tried to describe it briefly, and enclose the results for your consideration. In looking it over I fear brevity means obscurity. I do not know whether any one has elaborated the same idea.

" It is, that any particular factor in any particular species (plant or animal) has a quasi-independent existence, and can vary and be selected, etc., apart from all the other factors, of which the germplasm consists. That Mendelian factors arise in this way;—as a subsidiary point, that when any factor is divided into two races (Mendelian or still miscible) one of these (either ?) may recede much deeper than a Mendelian recessive, but still exist and be capable of declaring itself on occasion."

The note enclosed in Dr. Chapman's letter is printed below:—

"Many names have been given to the representatives in the germplasm of the various characters of the adult organism, genes, biophores, etc.: it will be simplest to call them 'factors,' as that is a term with which we are perhaps most familiar and with which there has been more elaboration of hypotheses than with almost any other.

"The hypothesis that I wish to suggest with regard to factors is not concerned with what they actually are. My own belief is that a factor is represented in the germplasm by a differentiation in the structure (chemical, organic or what not) of every molecule of the plasm; that it is present in every portion of the plasm. The hypothesis would perhaps be more easily seized and discussed if we accepted the view that a factor is something that could be separated from the rest of the germplasm, and the factor present in any zygote could be extracted and exhibited on the point of a needle.

"Let it be admitted that in talking of a factor we are talking of something that actually exists and may be discussed in very similar terms, whether it be merely a variation in structure of the whole protoplasm, or as a distinct and separable item.

"In defining a species, the most distinct character determining that two species are two species and not forms of one, is, that they are not syngamic. We meet, however, with abundant cases where this test gives a doubtful result. The two forms may be more or less fertile together, and the question whether they are two or one species has to be decided on other grounds, or left undecided, except in the opinions of individuals according to their idiosyncrasies.

"It is suggested as a hypothesis that factors act towards each other on the same principles, whatever they are, on which species act. To be a little more definite, the factors for some particular character, in two portions of germplasm of two different individuals, may combine freely, or may refuse to combine, or may present relations to each other that are intermediate in different degrees between these two extreme attitudes.

" The factors that refuse to combine and so produce intermediate forms are those that form the subjects of Mendelian research.

" How do they acquire this antagonistic position to each other? The answer must be in the same way that species acquire immiscibility, viz. by *natural selection acting on variation during periods of segregation.*

" Thus the factor for height in peas becomes in one race a factor for tallness, in another a factor for shortness, which prove to be immiscible. On the other hand, the factor for human skin colour, that one would expect to be more immiscible than that for height in peas, proves to be (invariably?) quite miscible.

" To account for such differences, we may appropriate any available explanations from the cases of possible species being more or less fertile *inter se.* In the case of Mendelian factors we may suppose that the selection has gone on long enough to give the two forms of a factor specific rank as against each other, just as it does in the case of any plant or animal. Where miscibility exists we may suppose the necessary selection has not continued long enough to secure fixity. We must probably call in another element about which, however, little is known. The two factors may be chemically (or otherwise) incapable of combining together. One would suppose this capable of arising more easily where the new variety arose by mutation, more difficult to picture as a result of gradual change by selection.

" The broad view would be that each species has a germplasm consisting of an enormous number of factors, each of which can act on its own part and without similar action on the part of other factors, as if it were a species liable to variation and selection. When the plasm of any two races (of plant or animal) presents a sufficient number of differentiated factors, or, more probably, when some important factors are sufficiently differentiated, the two races become distinct species.

" One may regard Mendel as having been especially fortunate in selecting for experiment the garden pea, which has an unusual number of easily recognised differentiated factors. It might be supposed that the garden pea has not been in

culture long enough for such differentiation to occur: it is, however, very possible that such differentiation was already established before the pea was taken into cultivation, and, in any case, the pea obtains very complete segregation by its method of fertilisation, so that segregation easily takes place without any geographical separation or any special care, and its results may appear more quickly than in forms that tend to continual crossing.

"There is a series of facts that are connected with this view of factors, but do not necessarily support or weaken it. These depend on what may be described as factors that are not recessive in the Mendelian sense, but in a much wider and deeper manner. The facts of melanism in Lepidoptera may be used to illustrate this.

"Early in the evolution of the Lepidoptera dark coloration would be very useful as assisting inconspicuousness, either on dark surfaces or amongst unlighted surroundings, and consequently many species no doubt acquired factors for melanism of one sort or another. When no longer useful the melanic factor must often have died out, and one cannot guess how often it may have been acquired and lost in any one Lepidopterous stirps. Melanism, however, crops up so often in individuals, sporadically, and is usually heritable, that it seems necessary to suppose that the factor for melanism has been present for many generations, or possibly ages, without declaring itself. Probably, however, sporadic examples have occurred, unobserved and unrecorded, throughout the whole period. Many other variations in Lepidoptera that are found at rare intervals are due to similarly receded factors — 'buried' might describe them, perhaps, better than receded.

"The Tephrosiae and allied Boarmiinae, which have, in so many species, developed melanism in our manufacturing districts, have given rise to an idea that must be erroneous— viz. that melanism has under our eyes originated *de novo* in each of these species. It is much more probable that these species have assumed and dropped the melanic facies many times, back perhaps to the time of their common ancestor, who possibly did so. They are a group that have the habit of resting on tree-trunks and rocks, and the wetness or dryness

of the local climate made them less or more conspicuous according as they happened to be dark in a wet climate, pale in a dry one, or *vice versa*, the eclipsed factor being for the time buried deeper than is implied in ' recessive ' as used Mendelially. It is generally (always?) the case that the species exhibiting this resuscitated melanism presents it as a Mendelian alternative to what we regard as the normal form, which it would not do were it recently acquired by selection."

Prof. Poulton said that the chief difficulty he felt on reading carefully this most interesting and suggestive note was in Dr. Chapman's " belief that a factor is represented in the germplasm by a differentiation in the structure . . . of every molecule of the plasm; that it is present in every portion of the plasm " (p. x)—words that were somewhat difficult to reconcile with those that immediately followed them; as also with the hypothesis that " the factors for some particular character, *in two portions of germplasm* of two different individuals, may combine freely," etc. (p. x); and especially with the " broad view . . . that each species has a germplasm consisting of an enormous number of factors " (p. xi). To suppose that every one of this enormous number was represented in every molecule of the plasm called up a vision of bewildering complexity.

To refer to one other conclusion (p. xii)—a Mendelian recessive, if present in a sufficiently small proportion of the population would seem to provide a burial so deep that a character might lie hidden for ages. On the other hand, hidden characters, like the melanism of *betularia*, were often Mendelian dominants and would appear when heterozygotes no less than when pure, so that here some form of deeper than Mendelian burial might be a necessary hypothesis.

As regards the suggestion that factors " acquire immiscibility . . . by natural selection " (p. xi), he had always believed that the growth of a complex mimetic pattern had been along these lines—viz. at first small variations—non-Mendelian; then, as by selection these became larger and larger, a point was reached when they followed the Mendelian rules. This could probably be tested in the primitive female forms of *Papilio dardanus* Brown, at Nairobi.

He had hoped for Dr. Chapman's opinion upon some of these comments, but the letter containing them was too late for a reply.

Notes on the Metamorphoses of Onthophagus taurus L.—Mr. Hugh Main, whose remarks were illustrated with some very striking lantern slides said :—

Fabre devoted a good deal of attention to the genus *Onthophagus* and particularly to *O. taurus*. When rearing this species at home from specimens taken last May at La Sainte Baume, in Provence, I found various divergencies from the details given in the "Souvenirs Entomologiques" which it might be of interest to put on record. Whether some of these are entirely due to the change of climate or not requires further investigation.

Fabre gives May as the nesting month, but mine did not start work till July. The insects were reared, some in flower-pots, others in subterraria such as I have previously described in our Proceedings. No special observations as to the formation of the food-masses and oviposition were made, but on examination of a cell on July 30, the egg was seen fixed at one end to the top of the hatching cavity, and projecting downwards (Fig. 1). In his earlier work Fabre says the nest has the food-mass occupying the base, and the cell containing the egg at the top. Later he describes the "birth chamber" as being at the bottom with the egg fixed on the wall, sometimes at the bottom of the cell and sometimes on the side, standing on its hinder end and projecting into space.

The egg when photographed was nearly ready for hatching, the dark jaws of the larva being visible through the transparent covering near the free end. The food-mass had been formed at the bottom of a flower-pot beneath the earth and built against a stone, as described by Fabre. By August 15 some larvae were nearly full-grown. They showed the large hump on the back which Fabre described as a "store-house of cement" (Fig. 2). He says: "The larva growing plumper and plumper and more and more humpbacked withdraws to one end of the cell which has become a crumbling ruin. Here it builds a casket in which the transformation will take place. Its materials are the digestive residuum converted into

mortar and heaped up in the hump." A large cavity has been made by the larva consuming its provisions, and this has to be reduced to small dimensions so as just to hold the pupa comfortably.

The wall of the cell was removed on one side for the purpose of photographing the larva which then began at once to rebuild the wall from its stercoral cement, which it discharged and moulded into position with the assistance of its mandibles. It soon closed itself in, and was allowed to rest quietly for a few days (Fig. 3). On again opening up the cell, the larva, of a beautiful clear white, " with its body emptied of all dross " is seen to occupy nearly the whole of the reduced interior whose smooth plastered wall was formed from the balance of the mortar (Fig. 4).

The first pupa was noticed on Aug. 27, " half-transparent and as it were carved out of crystal " (Fig. 5). Fabre gives the first week of July as the date for observing the " nymph " as he calls it. Unfortunately all my pupae except one were those of females. Both sexes have, however, certain structures which gave Fabre occasion for much speculation as to their use.

He says : " On the front edge of the corselet, a single horn arises, shaped like a cylinder ending in a conical knob. It points forward and is fixed in the middle of the frontal crescent, projecting a little beyond it. To right and left the abdomen is armed on either side with four little horns resembling crystal spikes. What does the insect propose to do with these excrescences? Nothing at all. They are passing fancies, jewels of early youth; the adult insect will not retain the least trace of them. When the nymph sheds its covering and the delicate tunic of the adult form is rent, these strange horns crumble into fragments with the rest of the cast clothing. In the hope of finding at least a trace of the vanished things the lens vainly explores the bases but lately occupied. There is nothing appreciable left; the nymph is now smooth; the real has given place to the non-existent."

Fabre follows this account with speculations as to the " motive of this horned magnificence," and advances various surmises on the subject. He says that none of the Onthophagi

has succeeded in hardening the nymphal thoracic prominence into a permanent horn, but, as pointed out by Mr. G. J. Arrow, some tropical species certainly possess a horn on the thorax.

Fabre concludes his chapter with the following words. "Then what is the meaning of these horny preparations which are always blighted before they come to anything? With no great shame I confess I have not the slightest idea. My reply may not be couched in learned phraseology, but it has one merit, that of absolute sincerity."

Examination of a cell which has been kept in the position in which it was formed by the parent, and in which the pupa has been formed undisturbed, discloses the solution of the problem that puzzled Fabre. He had dug up cells from his breeding cages and opened them without taking note of their proper orientation. He thus missed seeing the pupa in its normal vertical resting position, supported on the extremity of the projecting horn, with all the remainder of its delicate body free from contact with the surrounding wall. Only the tip of the tail assists in balancing it on its support (Fig. 6).

There is no doubt that the horn is similar in function to the various spines and bristles that appear on various parts of the pupae of other Coleoptera, viz. to keep the delicate organs out of contact with their surroundings while they are being fully developed.

Insects reared in subterraria allow of easy observation of their various stages exactly as they appear in nature. Clues are thus obtained to the meaning of structures, which otherwise might be missed.

The perfect insects were produced during the month of September.

Papers.

The following papers were read:

"Gynandromorphous *Plebeius argus* L.," by Dr. E. A. Cockayne.

"Butterflies from the Nile," by Mr. H. Mace.

"Types of Oriental Carabidae," by Mr. H. E. Andrewes.

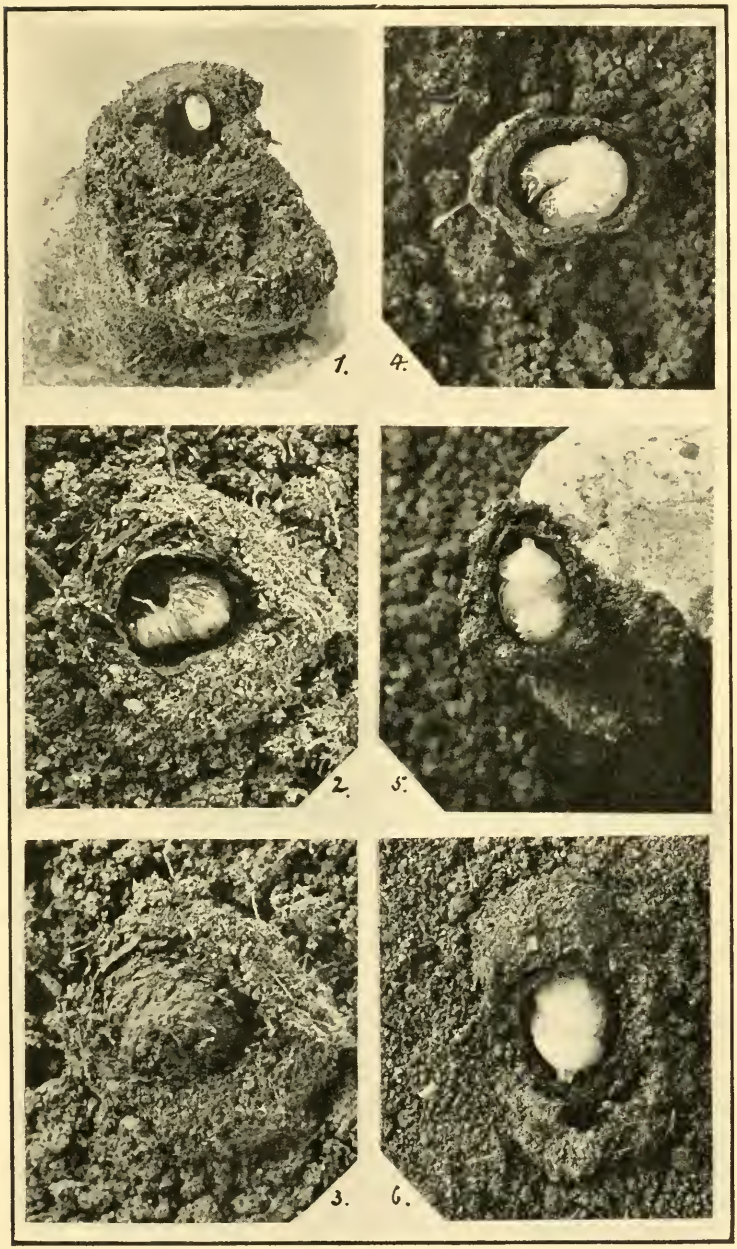
"New Genera and Species of Neotropical Curculionidae," by Dr. G. A. K. Marshall.

Explanation of Plate A.

Metamorphoses of *Onthophagus taurus* L.

Fig. 1. Ovum in hatching chamber.
2. Larva, full-fed, seen in opened cavity in food-mass.
3. Same food-mass after larva had repaired wall.
4. Larva awaiting pupation.
5. Pupa, showing anterior and lateral prominences.
6. Pupa in normal resting position, vertical in cell, resting on thoracic prominence.

All × 2 diams



Hugh Main, photo.

Metamorphoses of Onthophagus taurus L.

Wednesday, March 15th, 1922.

Prof. E. B. Poulton, M.A., D.Sc., F.R.S., etc., Vice-President, in the Chair.

Election of Fellows.

The following were elected Fellows of the Society:—Mr. Reginald Charles Treherne, Department of Agriculture, Ottawa, Canada; Mr. T. G. Sloane, Moorilla, Young, New South Wales, Australia; Mr. William Monod Crawford, B.A., Orissa, Marlborough Park, Belfast; Mr. Leonard Charles Bushby, 11, Park Grove, Bromley, Kent; Mr. Arthur Morel Massie, Park Place, The Common, Sevenoaks, Kent; Mr. Linnaeus Greening, Fairlight, Grappenhall, Cheshire; Dr. Francis Arthur, M.R.C.S., L.R.C.P., 395, Bethnal Green Rd., E. 2; Dr. H. Silvester Evans, M.R.C.S., L.R.C.P., Lomaloma, Fiji; Mr. John Wilson Moore, 151, Middleton Hall Rd., King's Norton, Birmingham; and Mr. John Edmund Eastwood, Wade Court, Havant, Hants.

Exhibits.

Insects from Mount Everest.—Mr. W. H. Tams exhibited and made remarks on a selection of insects, chiefly Lepidoptera, taken on the Mt. Everest expedition.

A New Beetle and Rare Moth from Madagascar.—Mr. O. E. Janson exhibited specimens of a new and very distinct species of *Euchroea* recently received from Madagascar, and also from the same country a bred female of the rare, giant Saturniid moth, *Argema mittrei*, with the cocoon from which it emerged.

Regeneration of Limbs in Carausius morosus.—Dr. C. J. Gahan exhibited a dead specimen of the well-known Indian Phasmid *Carausius morosus* in which homoeotic regeneration had taken place, an amputated antenna having been replaced by a tarsus. The specimen was one of a series on which the late Dr. T. A. Chapman had been experimenting some time before his death. So far as he could gather from some rough notes made by Dr. Chapman, which had been

handed over to him, along with the specimens, by Mr. T. H. Grosvenor, the antenna of the specimen shown had been amputated near the base when the insect was in its first or second instar. In a second specimen of the same series, which is still alive in the Natural History Museum, regeneration of exactly the same kind had taken place. In each case two or three tarsal joints, including the claw-joint, with its claws and pulvillus, are quite distinct, and their character is unmistakable.

The Chalcid Syntomaspis druparum Dalm., bred by Mr. Hamm, from hawthorn seeds in birds' droppings.—Prof. Poulton, exhibiting the seeds and Chalcids (Torymidae) which had emerged from them, said that Mr. A. H. Hamm's observations recorded below were prompted by Dr. J. Waterston, who had kindly determined the species referred to in this and the following note :—

"Between November 17 and December 16, 1919, over 2000 hawthorn seeds from birds' droppings were collected from under hawthorn trees in the grounds of the Oxford University Museum. The seeds had almost certainly come from blackbirds, which were constantly seen picking and eating the fruit. By December 17 nearly all the berries had been stripped and the trees were deserted.

"The seeds, separated from extraneous matter, were looked at from time to time up to the present date (March, 1922), and on August 26, 1921, a single female Chalcid had emerged and was found dead. It could only recently have died, as I was enabled to set it with scarcely any relaxing.

"A number of uneaten berries accidentally dropped by the birds in plucking from the trees, were also collected. These have been looked at from time to time, but nothing has so far emerged from them.

"In the course of a walk near Old Hincksey, Oxford, on December 13, 1919, a number of birds' droppings containing hawthorn seeds were picked up, several missel-thrushes being disturbed feeding during the search. Looked at occasionally since December 1919 a single female Chalcid was found alive on June 15, 1921.

"I have since separated the seeds from the other matter

with which they were mixed, and found the number to be 112.

"I also noticed large numbers of seed-coverings, nibbled and split, apparently by field-mice, which had extracted them from the birds' droppings. These small rodents had evidently taken advantage of the fact that the pulp had been removed, and no doubt many seeds were taken away and stored for future use."

Chalcididae bred by Mr. J. Collins from beetles in dog-biscuits and plum-branches.—Prof. Poulton exhibited two ♀ specimens of *Lariophagus distinguendus* Först. (Pteromalidae), found alive by Mr. Collins among living *Ptinus tectus* Boield., in broken-up dog-biscuits from Mr. Best's house —The Firs, Summertown, near Oxford (September 26, 1921). The beetles, also exhibited, were in far larger numbers than their parasites.

Also two ♀ *Elachertus* (*Entedon*) *leucogramma* Ratz. (Eulophidae, Entedoninae), and three *Scolytus rugulosus* Ratz., bred in June 1921 by Mr. Collins from a plum-branch received from Mr. Ashe of Hartlebury, near Worcester. The proportions of host and parasite were as in the preceding examples.

A new point in the procryptic resting attitude of Polygonia (Grapta) c-album L.—Prof. Poulton said Dr. R. C. L. Perkins, F.R.S., had written to him on January 8, 1922, from Newton Abbot:—

"My youngest boy, who has become a very keen Lepidopterist, and I were breeding some Comma butterflies this year, and I made the enclosed rough outline drawing of one in the resting position. Later I was reminded of this on reading your remarks about the white C [Trans. S.E. Union Sci. Societies, 1921, p. 8; also Proc. Ent. Soc. Lond., May 6, 1903], and I have just come across the sketch. You will see that if the edge of the closed wings, instead of the broad surface is looked at, a most wonderfully vegetable-like growth is represented, owing to all those lobes on the wing not meeting flatly, but being turned outwards. The appearance is that of numbers of little leaflets rising up from a stem beneath them. The outline of this specimen I made with *camera lucida*, and it only feebly shows the plant-like appearance of

the edge. No doubt our other Vanessas show this to a greater or less extent. I suppose it would have been classed by Brunner as ' hypertely.' "

A few days later Dr. Perkins wrote :—

" I cannot describe the curious way in which the leaflet-like projections appear, as if they might arise on more or less erect stalks. The appearance to me was not that of *dead* leaves at all.

" I think the commoner Vanessas will nearly all reproduce this appearance to a conspicuous extent, as I particularly noticed it in the case of a resting specimen of one of these—probably either *urticae* or *atalanta*, after seeing the Commas.

" The specimen I sketched was drawn, I believe, on the morning after the day it emerged, but I looked at all the 8 or 9 we bred, and the appearance was much the same in each.

" I fear I did not look at the Commas *obliquely*, so that the margin as well as the dead-leaf surface could be seen. I was so astonished at seeing the strange appearance of what is usually a thin edge, as such an edge would appear sufficiently invisible."

Dr. Perkins' drawing was exhibited to the meeting together with a male specimen of *c-album* which had been found hibernating in a shed at Oxford and had died in the position of rest, showing the appearance described above. The wing-edges of a second male, found a few weeks later on the railings of the Oxford University Parks, by Commander J. J. Walker, were bent outwards to a far less extent than in the exhibited individual.

The main significance of Dr. Perkins' extremely interesting observation—also made last year by Commander Walker—was, Prof. Poulton believed, to be found in the oblique views of the insect, and the view from the side, rather than in that from the edge. Inspection of the exhibited specimen showed that the jagged-leaf appearance was greatly enhanced by the out-turned edges when seen obliquely from the side, the number of visible projections being doubled and the effect further increased by the bending in two different directions instead of the maintenance of the plane of the wings. The effect was, of course, less marked from the direct side-view,

but even here when a nearer projection exactly covered a more distant one, the other pairs would be more or less "out of register."

It was obvious that in all these side views more or less of the upper surface of the more distant wings was visible, overlapping the edges of the nearer under surface. It was probable that we found here the interpretation of the broad dark margin of the upper surface in all the jagged "Commas" of the Palaearctic and Nearctic Regions—a modification of pattern which results in a dark upper surface being seen beside a dark under surface in side views of the position of rest. Looking at the patterns of closely related Vanessidae from this point of view it appeared probable that edges markedly out-turned like those of the Commas would only be found in *polychloros* and its allies.

The feature observed by Dr. Perkins was presumably a permanent character of the hardened wing-membrane, but it would be interesting to confirm this by looking at the expanded wings of the living butterfly. The drying of the wings and mode of appearance of the feature would also be well worth investigation.

It was extraordinarily interesting to find new observations, like these of Dr. Perkins, made upon one of our best and oldest known species.

Dr. S. A. Neave read a letter from Mr. W. J. Harding regarding the capture of *Polygonia* (*Grapta*) *c-album* at Holcombe in Devonshire, and some discussion took place as to the distribution and recent spread of this butterfly in the south of England.

Wednesday, April 5th, 1922.

The Rt. Hon. Lord Rothschild, F.R.S., etc., President, in the Chair.

Election of Fellows.

The following were elected Fellows of the Society:—Messrs. William George Clutten, 136, Coal Clough Lane Burnley; Edmund James Pearce, The Lodge, Corpus Christi College, Cambridge; George E. Hutchinson, Aysthorpe, Newton Rd., Cambridge; Charles H. Lankester, Cartago, Costa Rica; Arthur D. R. Bacchus, 29, Abbotsford Rd., Redland, Bristol; and Captain Douglas S. Wilkinson, Kennington Vicarage, Ashford, Kent.

Exhibits.

Mimetic Insects.—Lord Rothschild exhibited a group of mimetic Lepidoptera and Hymenoptera and made the following remarks:—

"The insects I exhibit—3 species of Amatidae (Syntomidae) of 2 genera and 1 species of Aegeriidae of the order Lepidoptera, a species of Braconidae (parasitic Hymenoptera) and a species of Vespidae of the order Hymenoptera—all show the same colour pattern, viz. black or brown with the apex of the fore-wings white. In addition to those exhibited there are 4 other Hymenopterous insects showing the same colour pattern, viz. *Monobia apicaliformis* Sauss. (Eumenidae) and *Iphiaulax* (*Ipobracon*) *semialbus* Szep., *Ipobracon* sp. and *Microdus simulatrix* Cam. (Braconidae). In the case of the Lepidoptera, the resemblance to the wasp is apparently protective, but the examples of the Braconid parasites are more obscure, though the resemblance to the wasp with its formidable sting is also probably protective.

"The species exhibited are Amatidae: *Pompyliodes albomarginata* Druce, *Pompyliodes aliena* Wlk., and *Amycles anthracina* Wlk. Aegeriidae: *Aegeria* sp. (Lepidoptera). Vespidae: *Parachartergus apicalis* Fabr. Braconidae: *Ipobracon* sp. (Hymenoptera)."

Butterflies from Co. Tyrone.—Mr. W. G. Sheldon exhibited on behalf of Mr. T. Greer a series of *Epinephile jurtina* approaching the South European form, *hispulla* Hb., and a series of *Pieris napi*, spring and summer broods, both of which showed much dark suffusion on the uppersides. In both generations forms occurred with ochreous ground-colour to the wings, and in which the veins on the undersides were almost equally coated with fuscous scaling.

Zeller's types of Crambids.—Mr. A. W. Pickard-Cambridge brought for exhibition Zeller's types of a number of moths, mainly Crambids, from Egypt and Palestine. He also exhibited aberrations of *Argynnis cydippe* and of *Zygaena* ? *transalpina*.

Colaenis telesiphe.—Mr. W. F. H. Rosenberg exhibited a specimen of *Colaenis telesiphe tithraustes* Salv., in which the band of the hind-wing is white as in *C. t. telesiphe* Hew. This specimen was taken at Rio Pastaza, Eastern Ecuador, in company with typical yellow-banded specimens of *C. t. tithraustes*. The band on the hind-wing is broader than in Peruvian specimens of the white-banded *C. telesiphe*. Peruvian and Bolivian specimens of *C. telesiphe* have hitherto been generally considered as *C. telesiphe telesiphe*, as distinct from the yellow-banded *C. telesiphe tithraustes* of Ecuador. But Hewitson's type of *C. t. telesiphe* in the B.M. is from Ecuador, unfortunately without exact locality. The narrow-banded form from Peru and Bolivia, therefore, appears to require a new name, as pointed out to the exhibitor by Captain Riley.

Lepidoptera from Florence.—Mr. Bethune-Baker exhibited a series of the fifth generation of *Heodes phlaeas* from Florence which began to emerge on October 21, 1921. The specimens were of the typical *spring* emergence, but were unusually small.

He also showed from the same district a specimen of *Zygaena transalpina* ab. *elongata* and another very beautiful, suffused specimen of the same species, the red suffusion being confined to the left wing. In addition a specimen of *Z. angelicae* v. *ochsenheimeri* was exhibited and was a very pretty pale yellow form.

Mimetic Grasshoppers.—Dr. G. A. K. Marshall, on behalf of Mr. B. P. Uvarov, exhibited some remarkable mimetic long-horned grasshoppers with their Cicindelid models from Java and Celebes, pointing out that the mimetic resemblance is present in the larval stages only.

A Moth with a Stridulatory Apparatus.—Dr. K. Jordan exhibited a pair of the Agaristid moth, *Aegocera mahdi* Pagenst. (1903), from East Africa and drew attention to the hitherto unknown ♂. This sex has a stridulating organ in which the hind-wings and hind-legs participate. The wing-portion of the organ consists of an elongate semivitreous stripe occupying the greater part of the cell of the hind-wing; on the underside the subcostal vein is swollen and non-scaled, projecting much more than in the ♀ and being slightly curved. In the hind-leg the first tarsal segment is likewise swollen and bears on the upperside a naked stripe on which a number of very shallow transverse grooves are visible. The structure renders it evident that during flight this tarsal segment plays across the inflated subcostal of the hind-wing. No observations on the sound produced have as yet been made by the collector of the specimen (W. Feather).

Dr. Jordan added that last summer he had had an opportunity of examining *Pemphigostola synemonistis* Strand (1909) placed by Strand in the Castniidae as a new sub-family and referred to in our Proceedings of 1921, p. xxxiv, as probably being an Agaristid. This opinion proves to be correct. *Pemphigostola* is a genus of Agaristidae belonging near *Aegocera*.

Dr. Jordan further exhibited a number of specimens of the interesting Lycaenid, *Liphyra brassolis* Westw. (1864), from various localities and a ♂ of the second species of the genus, *L. castnia* Strand (1911), obtained in the Hydrographer Mts., British South-East New Guinea. *L. castnia* is distinguished, *inter alia*, by its more rounded hind-wing, very short palpi and the transverse position of the black patch on the underside of the fore-wing.

Dr. S. A. Neave gave an account of the fauna of Mt. Mlanje, Nyasaland, and illustrated his remarks with lantern slides and with an exhibition of some typical insects from that locality.

Wednesday, May 3rd, 1922.

The Rt. Hon. Lord Rothschild, F.R.S., etc., President, in the Chair.

Obituary.

The President announced the death of Mr. A. W. Bacot, while engaged on typhus research in Egypt, and also of Mr. Gilbert Storey, of the Department of Agriculture, Cairo, Egypt, and a vote of condolence to their relatives was passed.

Election of Fellows.

The following were elected Fellows of the Society :—Mr. C. L. Collenette, c/o Messrs. Barker & Co., Singapore; and Mr. Michael G. L. Perkins, 4, Dean's Yard, Westminster Abbey, S.W. 1, and Trinity College, Cambridge.

The Collection of Portraits.

The Treasurer called attention to additions to the collection of portraits in the meeting room, and especially to a beautiful pencil drawing from a photograph of the late Dr. Longstaff.

Exhibits.

Butterflies from Rumania.—Mr. W. G. Sheldon exhibited a series of *Pararge roxelana* from Herculesbad, and of *P. climene* from Sarepta, and noted the segregation of the sexes in these species in a state of nature.

Comments on this exhibit were made by Comm. Walker and by Miss Fountaine, who described some of her personal experiences of capturing *P. climene*.

The Life-history of Catochrysops phasma Butl., etc.,—Prof. Poulton said that he had received a letter, dated March 14, 1922, from Dr. A. Connal referring to the note on p. 401 of Trans. Ent. Soc. Lond., 1921. The following passage shows that the failure to receive a reply was in no way due to Dr. Connal, but must be attributed to the post :—

"I can assure you that I answered your letter and now repeat the gist of what I wrote. As you will see from Farquharson's letter, which I enclose, he made very complete arrangements. But what happened was that Farquharson himself on the day before he sailed left three small tins of larvae with me. His boy, Joe, brought neither larvae nor food, nor did any come by train, with the result that all the larvae died without having shown signs of pupation."

The letter from Farquharson, dated August 28, 1918, contains the following passage—somewhat shortened—together with two other references to observations published in the 1921 Transactions :—

"I wished to give you some insects in the hopes that some of them will complete their life-histories in a few days after I leave. In any case I'll trust to your good nature and send them to you by Joe, and have arranged for tins of the chop plant to be sent you by every down train till they are fully fed. As a matter of fact the expectation is that they will die, for it is possible that they cannot complete their life-histories without passing a part of their lives *chez* the ant *Camponotus maculatus*. If they pupate the imagos will emerge ten days later."

The letter also referred to the *Dermestes* larvae he intended to leave (p. 436), adding that "one or two Diptera may also breed out"; and in conclusion he promised to send Mrs. Connal a box of chocolates for Christmas "if that beast *is* a *Ceratopogon* and not a Cecidomyiid" (p. 441).

Notes on the life-history of a Bethylid (Hymenoptera) of the genus Cephalonomia Westw., observed at Oxford by Mr. A. H. Hamm. The Bethylidae are Fossorial Aculeata.—Prof. Poulton gave an account of the following remarkable observations by Mr. Hamm and exhibited the specimens referred to together with the type material of *Cephalonomia formiciformis* Westw. :—

"The minute female Hymenopteron (Bethylidae) exhibited to the meeting was captured on August 4, 1918, in my garden, 22, Southfield Road, Oxford. She was walking on an old post a few inches from the ground, carrying in her mandibles a Coleopterous larva (? *Cis*) at least six times her size and

probably more than that number of times her weight. The captor and prey were placed in a small glass-bottomed box and looked at from time to time during the following two days. On each occasion she was seen to be carrying the larva just as when first captured, holding it with her mandibles by the posterior end near the anus, so that it projected well in front of her head. In spite of the apparently cumbrous burden carried high in the air, she moved about with the greatest facility. Although the larva was alive its movements were extremely feeble, in fact more like those of one that had been stung by a Fossorial wasp.

" Late on August 6 I was reluctantly obliged to kill her, as I was leaving home for a fortnight. She was still carrying the larva when I stifled her with a drop of benzine, but this did not injure the prey. I thought I could see several ova attached, but these, when examined under a $\frac{1}{2}$-inch objective, turned out to be four larvae symmetrically placed one on each side of the second and third thoracic segments of the victim. It therefore became clear that the mother had been carrying about the larva with her offspring attached and feeding.

" On my return home on August 20 they were still attached to their host and had evidently been feeding throughout in the same position. On the following day the larvae had left their host and had spun small white silken cocoons in a cluster on the edge of the box. The cocoons were examined at frequent intervals, and on October 4 imagines were found to have emerged from all four, and were quite active.

" The Bethylid almost certainly belongs to the genus *Cephalonomia*, described by Westwood in Loudon's Mag. Nat. Hist., vol. vi, 1833, p. 420, but it is doubtful whether the species is Westwood's *formiciformis*, loc. cit."

Mr. Hamm's doubts as to the specific identification of the insects were confirmed by Dr. J. Waterston, to whom I submitted the specimens together with Westwood's type material. He kindly wrote on April 10, 1922 :—

" Hamm's *Cephalonomia* runs down, according to Kieffer's tables (Tierreich, 41, p. 242), to *C. mycetophila* Kieff., a French species with which I am not acquainted.

" The differences between *mycetophila* and *formiciformis*,

according to Kieffer, are mainly in the neuration. Hamm's specimens show a distinct median vein as well as a basal. These are said to be absent in *formiciformis*, but Westwood's type is too clogged up with gum to permit the wings to be seen distinctly. Still I think Kieffer is probably right in what he says. On the other hand, he declares in his key that the scutellum of *formiciformis* is 'without a cross furrow,' which in my opinion would be remarkable. I find, however, that Westwood's type *has* the cross furrow, so that in one point at least Kieffer is inaccurate. How far one can trust him in other respects I don't know. And there is, of course, the further question of the value to be attached to such differences as he has noted. I hope later to take up the genus *Cephalonomia* when completing my work on grain pest parasites. I shall then be glad to go most fully into Hamm's interesting material. Meantime I can only say that I do not feel justified in referring these specimens to Westwood's genotype."

The habits described by Mr. Hamm confirmed the account given by A. H. Haliday in the Ent. Mag. II, pp. 219–221 (1835). He here stated that on the 5th of "last" June, presumably in the year 1833 (for his paper appeared in the number published April 1834), he observed a female Bethylid carrying a full-fed Tineid larva at the sand-cliffs, doubtless in the neighbourhood of Dublin. The Bethylid had seized its victim by the underside of the mouth so that it was dragged along on its back, and on one occasion when a different hold had been taken and the larva's ventral surface was uppermost, inconvenience was caused by the feet grasping objects on the ground. But the Bethylid quickly discovered its mistake and took a new hold in the usual position. The larva was, Haliday believed, about six times the weight of its captor, and it was being carried up the sliding sides of a pit in the sand. The efforts of the Bethylid and the use it made of grass, twigs, etc., to aid its ascent are described in much detail. When it had climbed up about two feet it came to a piece of reed partly buried in the sand and open at its lower end. Here it fixed its prey between two shreds of leaf, explored the bank, descended the reed, entered the hollow stem from below,

came out again, seized the larva in the usual place and began to carry it down the reed. Then once more it fixed the larva, examined the hollow, returned and dragged the larva to the opening, again left it and " plunged in itself, but immediately reappearing, drew in the larva head foremost, speedily disappearing in the interior." At this point Haliday left the insect, but records the conclusion that in all probability " the bore of the reed was employed instead of an artificial funnel, for the cells which should contain the progeny of the *Bethylus*, with its store of provision."

It was possible that Mr. Hamm's Bethylid was engaged, just like Haliday's, in seeking for a hole, but being confined in a box and unable to follow the normal instincts, it laid eggs on the prey and continued to carry it about after they had hatched. It was to be hoped that the observation might be repeated under conditions which would permit of the prey being stored.

Dr. David Sharp, F.R.S. (" Insecta," I, pp. 535–6), had doubtfully placed the Bethylids among the Proctotrupidae, pointing out that Haliday's observation was unconfirmed. Complete confirmation was now forthcoming, not only by Mr. Hamm's record but by many others published in recent years in the Proc. Hawaiian Ent. Soc. The facts there made known by Mr. J. C. Bridwell and others conclusively showed that the habits of these remarkable insects are those of Fossorial Aculeates.

Dr. R. C. L. Perkins, F.R.S., had very kindly drawn up an abstract of the chief results which have been arranged as in the classification of the species according to their habits adopted by Bridwell, and here quoted in a condensed form on p. xxxi. The years and pages quoted refer to the Proc. Hawaiian Ent. Soc.

(1) *Epyris extraneus* Bridwell.—Francis X. Williams describes this species (1918, pp. 55–63) as stinging a Tenebrionid larva twice her length, carrying the heavy load off on her back, and wedging it between pieces of earth while she finds a suitable nesting-place, the procedure thus resembling that described by Haliday. The life-history of *E. extraneus* is given in great detail and fully illustrated.

Holepyris hawaiensis Ashm., is stated by Bridwell (1919, p. 311) to sting small Lepidopterous larvae.

(2) *Perisierola emigrata* Rohwer, and *Sierola* sp. attack various Lepidopterous larvae in pods of Acacia (Bridwell: 1918, pp. 21 *et seq.*), the former species stinging in three places ventrally—throat, middle and anal extremity—ovipositing (usually 2–8 eggs) an hour or two later. In captivity *Perisierola* attacked almost any larva supplied, sometimes ovipositing, but sucking the juices of beetle larvae. The 5–7 larvae of *Sierola* will completely destroy a caterpillar of *Cryptophlebia vulpes* Wlsm.

(3) *Scleroderrnus immigrans* Bridwell.—A captured female attacked (1918, pp. 21 *et seq.*) a Bruchid larva (*Caryoborus*) with its mandibles, and fed on juices. Two days later and subsequently she laid eggs on the larva. The use of the prey as food for both Bethylid and its offspring may throw light on Mr. Hamm's observation.

In a later paper (1919, pp. 291–305) Bridwell described the life-history of this species in great detail. The natural prey observed consisted of beetle larvae of six species—one a Bruchid, two Bostrichids, and three Cerambycids. The Bethylid was bred [in captivity as Dr. Perkins states] on these and many other beetle larvae, the larvae of bees of the genus *Nesoprosopis*, larvae of Fossors, ants, Bracons and Chalcids, also on a Termite.

More than one female was found in the field associated with a single host larva. They " lived in harmony on the paralyzed prey, oviposited, and the progeny of the different females reached maturity without interference from the others."

" This tolerance extended even to the grubs of other species of *Sclerodermus*."

S. immigrans is an immigrant from the Philippines (1919, p 305), but several endemic (viz. Hawaiian) species of *Sclerodermus* were obtained from various Microlepidopterous larvae feeding in dead wood and some from beetle larvae.

Cephalonomia sp.—Three females from cocoons found by Bridwell (1919, pp. 305–309) in the tunnels of the Scolytid

larva *Hypothenemus* were used for breeding, being placed in tubes with short pieces of twig containing the beetle larvae. In one tube, after three or four days, two larvae bore each a single egg on the ventral surface and in two weeks a female *Cephalonomia* was bred out. Later examination of the same tube revealed beetle larvae bearing one to two eggs or larvae, and a fair proportion of these spun cocoons.

One of the remaining Bethylid females died without oviposition and the other was less fruitful than that described above.

When pressed for food the parent *Cephalonomia* will itself feed on the juices of the prey, also on the pupal and adult beetle.

Using fine glass tubes rather larger than the burrow and adding débris from the burrows, Bridwell was able to see that the *Cephalonomia*, when she encountered a larva, stung it in the head, and a pupa in the tail. In a few minutes the six larvae and pupae were paralyzed but no eggs had been laid in two days.

After about twenty adults had been reared the colony died out, owing to the difficulty in finding minute beetle larvae.

In the course of the investigation it was found that *Cephalonomia* would oviposit on other minute beetle larvae as well as on *Hypothenemus*.

Bridwell considers that *Cephalonomia* resembles *Sclerodermus* in its habits.

Cephalonomia gallicola Ashm.—This species attacked but did not oviposit on beetle larvae in imported Californian barley on which the Bethylid was found.

The habits of the Bethylidae are thus classified by Bridwell:

(1) The *Epyris* group with the adult markedly fossorial in habits, feeding on sweets as well as juices of prey, and laying a single egg on each host.

(2) The *Goniozus* group attacking concealed Lepidopterous larvae and laying several eggs upon them without moving them. *Goniozus*, *Perisierola* and *Sierola* are known to attack thus, and *Laelius* apparently belongs here.

(3) The *Sclerodermus* group in which adults feed exclusively on juices of prey which they attack in hiding and do not move. Several eggs may be laid on the prey.

Dr. Perkins, referring to these fine observations, had written with natural gratification :—

" It is remarkable that the biology of Bethylidae should have been so much elucidated in little Hawaii, with its meagre fauna ! The biological work on the allied Dryinidae was also published there, being the result of observations of Hawaiian entomologists. So also that on the *Pipunculus* flies and on the Stylopidae. There is no doubt that Hawaii can congratulate itself on the work of its band of entomologists ! "

Fellows of the Entomological Society would also wish to add their congratulations.

Mr. A. Loveridge's notes on the Driver-Ant Dorylus nigricans Illig., at Kilosa, Tanganyika Territory.— Prof. Poulton gave an account of the following notes and exhibited the specimens referred to by the author. In the determination of the species he had received the kind help of Dr. G. A. K. Marshall and Mr. W. C. Crawley. A few additional facts recorded below were quoted from letters written between July 11, 1921, and March 1, 1922.

" Kilosa is now spelt with one ' s '—Roy. Geogr. Soc. ruling." It was spelt " Kilossa " in Proc. Ent. Soc., 1921, pp. lxii, xci.

The " Marmalade Ant " (*Camponotus maculatus* F.) was described as " harassed by Driver-Ants," the " Cocktail Ant " (*Cremastogaster castanea* Sm., r. *tricolor* Gerst.) and the " Small Ant " (*Pheidole* sp.) as " left in peace." The " Lesser Stink-Ant "—" a match for the Driver-Ants,"—was so called " as we have an outsize in these creatures here."

The " Green Bug," *Platacantha lutea* Westw., " which came to light in great numbers during the rains, was comparatively scarce at the time of the invasion, but was eaten by the Drivers." The " Brown Bug," *Nezara chloris* Westw., also eaten, " began coming to light in great numbers during the rains."

From a later letter—" I have only recently read Carpenter's notes on the Uganda Driver-Ants [Proc. Ent. Soc., 1914, p. cix] in which he says that they approached but retreated from a bug, and he suggests that the peculiar odour of the bug may have protected it. The reverse happened here, Drivers swarming to the spot where a bug was and the whole house reeking of the smell."

Account of an Invasion of "Siafu" or Red Driver-Ants—Dorylus (Anomma) nigricans Illig., by Arthur Loveridge.

Kilosa,
Tang. Territ.,
July 3, 1921.

At 8 a.m. I discovered we were being invaded by Siafu, who were entering the stonework base of the house at half-a-dozen different points, and were already up the door plinth and under the roof at one spot. Beetles, whose presence we were unaware of before, were flying in numbers before the advancing host, frequently with one or more of the red furies attached to their hind legs. Wretched crickets and small grasshoppers were being dragged off, feebly waving the one or two legs that remained to them. The "Marmalade Ants," [*Camponotus maculatus* F., ? race], such a pest in the safe, were driven from their hiding-place and sought refuge amongst books and papers on the table, thereby hoping to evade the flanking scouts seeking hither and thither along the lines of march for fresh supplies for the columns. My pet jumping spiders cleared for their lives with prodigious leaps; one black Carabid beetle clung to the table-cloth whilst a column of invaders streamed past within six inches of him, yet found him not. As is well known, these Driver-Ants, being blind, find their prey by scent.

Soldier-sentries were stationed at intervals of two inches along the lines of the column, waiting with fore-part of the body raised and widely-open jaws for any disturbers. A match-stick being presented to three of these in turn, they readily seized it and were transported eighteen inches away from a hole into which a stream was disappearing. They ran hither and thither and could not find their friends for some time; the first succeeded in doing so after an interval of three minutes, a second following his tracks a little later.

The holes into which they were entering and from which they were issuing formed a regular warren owned and occupied by an inch-long black ant which I have christened the "Lesser Stink-Ant" [*Paltothyreus tarsatus* F.]. From time to time one of these would hurry from an exit as if puzzled and bewildered, and then bolt down another hole. Several of them were attacked by workers of the Siafu, but they readily rid

themselves of one such aggressor: their body was curled under—but I could see no sting—and their jaws came into play with great rapidity. Three Siafu were about a match for one Stink-Ant and I watched one such struggle through a high-power glass. Generally speaking, the Siafu, which were attacking every other creature I could see, left the Stink-Ants alone.

In the afternoon I witnessed an interesting sight. Two holes, one leading into the wall, the other into the ground, had a common opening. Siafu were streaming into the wall, and had a strong barrier or cordon of soldiers thrown across the aperture of the second hole. I was just in time to see a Stink-Ant come from the interior of this second hole very softly, seize a soldier by his jaws and, hauling him from his comrades, drag him into the hole. I settled down to watch and saw this little passage of arms occur a number of times. The way the Stink-Ant would appear and disappear, lurking in the entrance, was very sinister: then, approaching the wall of Siafu gently, he would pause; the soldiery would quiver with excitement and reach forward toward him, but discipline or good sense forbad them to break their line. Suddenly one would be seized, although occasionally the Stink-Ant would fail, and if several soldiers caught him, as happened twice, another Stink-Ant would come to the rescue and a mêlée would follow in which the line would get broken.

All around the walls of the house are many of the inverted cone-shaped pits of the Ant-lions, and it was a common thing for the Siafu workers to tumble into these and be caught. I wondered what the Ant-lion could do against the more formidable soldier Siafu, and so dropped five of them into five pits. The question was obviously incorrect and should have been "What could the Siafu do?"

The soldier would be seized by the Ant-lion by one of the middle pair of legs, and, struggle as he might, he could get no purchase on the shifting sand. There was nothing else for him to do but struggle, nothing of the unseen foe to attack, nothing but shifting sand for his formidable jaws to bite. As he weakened the abdomen was drawn down, and in one instance I saw it nipped by the jaws of the Ant-lion, which

then released the soldier, leaving him quite limp and I fancied at first poisoned, though knowing no instance of Neuropterous insects secreting poison. However, the other four soldiers struggled till the last vestige of their champing jaws disappeared from view in the sand-pit. What a wretched death for the Siafu, worse than being engulfed in a quagmire, but not worse than those of the thousands of small insects which were even now being torn from their retreats in crack and cranny by the moving host.

I presently observed a second species of ant, hereinafter called the "Cocktail" [*Cremastogaster castanea* Sm., r. *tricolor* Gerst.], which was also immune from attack by the Siafu. These Cocktail ants have long dwelt in a corner of the verandah, and at first greatly plagued me by eating insects left on the table or setting-boards, until I found how to turn them to good account as the preparers of bat and rodent skulls—work which they do delicately and beautifully in forty-eight hours when the skulls are small. These Cocktails have regular runs and never invade the inner rooms, so setting-boards were kept in an inner room and there was no more trouble. The Cocktails ran about where the Siafu were, but when baits were laid down the Siafu did not feed at the bait used by Cocktails nor the Cocktails at that eaten by the Siafu. *En passant*, I might say that the Cocktails differ from the Siafu in that they like jam, sugar and sweetstuffs generally, while the Siafu are out for blood and fresh meat only. Some species of Cocktails are very fierce, but this species never bites when handled, and the only reason for their not being molested by the Siafu, as far as I can see, is that they are not juicy enough to be worth molesting. Another small ant was also left in peace by the Drivers. [The examples sent were *Pheidole* sp., and among them a single *Tetramorium blochmanni* For., r. *continentis* For.]

Whilst fully appreciating the Siafu as a family friend assisting at a sort of spring-cleaning and ridding my residence of insects of all kinds, I did not desire that they should take up permanent residence should they find it a land of plenty, and I was also in some trepidation as to their attitude towards preserved specimens and entomological collections. There-

fore I stuffed paper soaked in prussic acid into the holes they were entering, swept back the columns into heaps and cremated them with paraffin and grass—a dreadful but natural death, as a grass-fire, many miles in length, was even at that moment sweeping across the plains below, destroying all life that failed to escape in time. In a quarter of an hour of all that ordered host only a few score individuals were visible and these were wandering aimlessly hither and thither. I congratulated myself on having punished them so severely that the survivors would leave such an unhealthy locality.

About 9 p.m., as I was reading, I became gradually conscious of many small noises, making altogether quite a volume of suppressed sound. Some time later on taking up the light and going to my bedroom the reason was obvious. The white-washed walls were a moving mass of Siafu; they swarmed upon the books in the bookcase, over-ran other shelving, chest of drawers, etc. The sound was made by the feet of the countless multitude. Almost every minute some insect fell from the ceiling with several Siafu clinging to it, only to be set upon by the ants which were crossing the floor in lines in every direction. In nine out of ten cases the prey was a brown or green plant-bug [brown = *Nezara chloris* Westw.; green = *Platacantha lutea* Westw.: (Pentatomidae)], which, since the cessation of the rains three weeks ago, has been coming in to the house. They fly with a short buzz like a bee, collide with some object and fall upon their backs, where, on a cement floor, they are more helpless than a tortoise. Till this evening I was quite unaware of the huge numbers of them which had taken refuge in the house, hiding in cracks, under boxes, amongst clothes, etc. When molested they give forth the familiar and powerful odour of bugs, and this instead of repelling seemed to excite the Siafu, which hastened to the spot from all directions. Soon the struggling bug was lost to sight in a heap of Siafu which, having nipped off its legs, would drag it along one of their lines of march. Although the bugs were treated in this way, but few were taken to their holes, and we swept up a hundred or so the following morning. The atmosphere of the room reeked with their defensive (?) odour.

It was necessary to mark time rapidly or else the ants would soon have swarmed on the feet, and, when once climbed up, it was necessary to run out on to the verandah and pull off the biting fury, for if you paused for just the moment necessary to remove one, half-a-dozen others would have gained a foothold on your slippers. Keeping both feet on the move therefore I procured wash-basin, soap-dish, etc., and placed them beneath the four feet of the bed, which was as yet untouched. These I hurriedly filled with water from the jug, raised the mosquito net and jumped in to accomplish disrobing in some degree of comfort. I was much disturbed by the squeaking of bats (*Chaerophon limbatus*, probably) in the roof, the occasional rush of a rat, and the continual falling of particles of whitewash or grit from the ceiling, dislodged by the myriad ants working along the spaces between the ceiling-boards like so many ferrets searching for rabbits.

July 4.—At daybreak the Siafu were still on the move, though those on the walls had all descended and were forming up into regular moving lines on the floor. Finding that fire affected but a small number, the rest escaping quickly, my boys and I swept up the columns and dropped shovelful after shovelful into two basins of water with the surface oiled by a film of paraffin. This killed them more rapidly than anything, and in a minute or two they would cease to struggle. After an hour-and-a-half's hard work scarce a Siafu was to be seen.

Towards sunset (6 p.m.) small lines issued from a hole at the base of the wall (outside) and entered another hole; a second line was going in the reverse direction. Neither company bore any spoils, and their procedure seemed aimless and foolish unless, indeed, we suppose it was a practice route march for two companies to pass through each other without confusion. I have noticed this with Siafu many scores of times.

At 8 p.m. a living stream, six or eight ants wide, was going straight up the verandah wall, and into, or rather beneath, the roof, and, next day, their track was visible as a brown streak on the wall.

At 10 p.m., on entering my bedroom, I was met with the

same sight and smell as on the previous evening. I was just about to get into bed when a few Siafu on the net caused me to climb on a chair from whence I could inspect the top of the net and the sight of a couple of hundred Drivers there (which I then imagined had fallen from the ceiling, as the bed-feet had been left standing in basins of water) caused me to modify my arrangements. Accordingly I took up my pillows and blankets and sought refuge in an unoccupied building some three hundred yards away, where I fared little better than at home, as I was awakened at 2 a.m. and pestered by fleas till daybreak at 6 a.m.

July 5.—Returning home, the boys assisted us to carry on similar operations of wholesale destruction as on the preceding day with the additional precaution of putting down hot ashes at their holes. By 9 a.m. they had all retired. The columns had commenced to move again just before dusk; I think it was shortly after 5 p.m. when I first observed them.

At dusk therefore I laid down ten baits consisting of large lumps of eagle flesh. At 10 p.m. I visited these, and five, which were quite hidden beneath a host of Siafu, I picked up hurriedly with a pair of entomological forceps and dropped into a basin of water filmed as on the preceding day with oil. We thus destroyed several thousand in a few minutes with the greatest ease.

I then retired to bed, having had a new mosquito net put up with a much finer mesh in case any of the ants should fall from the ceiling. Despite the fact that the walls and floor were a crawling mass of live ants, I slept in confident security until 2.30 a.m., when I was awakened by the splashing of a crocodile in its pan. Most of my creatures I had moved outside the previous day, but thought that the young crocodiles in their tank could defy Siafu; the tortoises had also been left in their pen, as it was outside, though against, the house. Heroically I decided to rise and go to the rescue despite the ants on the floor. Untucking the net, therefore I stretched forth a hand to turn up the lamp, and encountered an ant on the handle; then I saw a few ants on my pillow and beheld two single lines moving up the net, one inside and the other outside the net. By turning up the mattress and

giving the net a more generous tuck-in I stopped the inside stream; then jumping up I got out on to my slippers, around which ants were swarming. First I examined the pans of water in which the bed-legs were standing: across one of these at the head of the bed a company of sappers had thrown a bridge composed of living ants upon which their comrades were crossing and so up the net. Unscrewing the cap of the lamp container I hurriedly splashed out enough oil on the bridge to cause its collapse, and also to form a film of oil on the water beneath, in which many a gallant Horatius Siafu-soldier lost his life.

The other pans being similarly treated to an accompaniment of rapidly moving feet, as if I were smitten with St. Vitus's Dance, I went out to the crocodiles' cage. One poor beast about 15 inches in length was revolving round and round in the water, belly and back being alternately uppermost, while all the time he threshed the water with his tail in an effort to rid himself of his inexorable assailants. The edges of the rectangular pan (2 ft. × 1 ft. 6 in.) were lined several deep with a throng of onlookers, which hurled themselves upon the croc. whenever his struggles brought him near the side. Pulling up the glass door and getting a shower of Siafu on my arm in so doing, I pulled the croc. out by his tail and threw him ten feet away, where unfortunately there was a very big swarm of ants. Running to the spot I tossed him outside another ten feet or so; here we were free from ants, and I leisurely picked him up with a pair of forceps and dropped him into the drinking-pan in a case containing half-a-dozen Puff Adders. In the morning he had freed himself of all his foes save one Siafu on either eyelid; these I picked off with a forceps and got bitten in thanks. He felt very seedy for a day or two, but survived his ordeal.

Returning to the house I looked for the other crocodile, but it had sought refuge beneath the hay, and as there was no motion or struggle going on I correctly concluded that it was dead. I had had it for more than four months. The tortoises were making such a commotion in their enclosure that I started in that direction, giving the bushes a wide berth as nearly every leaf was crawling with ants; the

ground was, of course, teeming with them. One heap of ants being particularly dense, I turned it over and found they had killed a chameleon (*C. d. dilepis*), which had doubtless fallen from the bush, beneath which it now lay. Nothing but bones were left in the morning; the ground that lay between me and the tortoises was so alive with Siafu that I very regretfully turned back. Many of the tortoises would be under their rockeries, from which it would be impossible to get so many of them in a hurry.

Once more, therefore, I sought the shelter of my mosquito net, cast the blankets which might be harbouring foes into one corner, killed a few ants on the pillows, and then sat upon these in the centre of the bed and reviewed the situation. The enemy column that had entered the net was wandering to and fro on the ceiling of it, whilst a score or more of individuals were frantically rushing about on the sheet or sides of the net. Armed with my entomological forceps I picked these off one by one, killing them as I did so. The column on the ceiling of the net was similarly disposed of—a hundred or so. On the outside of the net there were still approximately two hundred which had been cut off from retreat by the collapse of the bridge. These I dislodged by striking the net sharply on the inside so that most of them fell to the floor: some clung on, however, and to my disgust the workers made their way through the mesh of the net—I killed one in the very act of struggling through, and half-a-dozen that had already done so. The big-jawed soldiers stayed without. I killed the others, one by one, as they got in till I was left in comparative peace, speculating whether the Psalmist had a visitation of Siafu in mind when he referred to "the terror by night."

My own immediate troubles being ended I listened to the sounds in the roof, which were easy of interpretation. A rat, attacked, ran for its life, then paused to rid itself of its aggressors, but the pause only gave opportunity for reinforcements of the foe; with a frightened squeak it ran on, escaped to the outer roof, where it lost its foothold on the galvanised iron, and rolled down, landing with a thump on the ground outside; presumably it escaped, for morning revealed no heap of bones

or mass of ants at the spot. Not so fortunate were the nestling rats—at least, so I judged them to be by a series of small squeaks which gradually grew fainter. It made one shudder to think of the awful death scores of small creatures were dying. The bats had left on the first day, though I found one dead clinging to the mosquito gauze of the window. Perhaps it died of fright, for, had the ants attacked it, they would not have left one bone uncleaned. Several geckos (*Hemidactylus mabouia*) gave the ants a good run; some were killed, some escaped and were running about next day as if nothing had happened.

July 6.—From 2.30 a.m. to 5.30 a.m., therefore, I lay awake, sleep being out of the question. At 5.30 I called the boys that we might harass the ants before they gained cover in their holes at daybreak. We first collected the ten meat-baits—each a mass of ants. It is difficult for one who has never seen Siafu to conceive of the way in which they pile themselves, one upon another. When the baits had been dropped into the basins we fired the hay in the crocodiles' cage, which as already stated was a seething mass of moving ants: the body of the crocodile was recovered, or rather the skin and bones. With handfuls of blazing grass we swept up the lines of ants proceeding to the tortoise enclosure, and then went in to effect their release, continuously moving our feet to frustrate attack.

To my relief all were alive. Bell's Box Tortoises (*Cinnixys belliana*) had practically defied attack, and only one or two Siafu were hanging on to each individual. Their armour-plated fore-legs, when drawn in, protect the head in a most wonderful fashion; they had had such a fright that not one of them extruded its head whilst I was there. The Soft-shelled Land Tortoises (*Testudo loveridgii*), on the other hand, had fared badly. Many had a score of Siafu attached to them, one had its eyelids badly eaten. I dropped all these into a drum of water, and then set a native to work picking off the remaining Siafu with a pair of forceps.

On entering a room where sundry specimens are kept I found it still, at 7 a.m., swarming with Siafu, and from the drying-safe came the rasping of their feet on the gauze mesh.

The previous evening I had taken the special precaution of having raw cotton (kapok) stuffed all round the door to prevent entry to the safe. In spite of this they had got in, but did not seem able to get out. I expected the fifty odd butterflies that were drying would all have perished, but was agreeably surprised to find that only those caught within the past two days had been touched.

These included *Salamis anacardii nebulosa* Trim., *Neptis saclava* Bd., *Euphaedra eleus orientis* Rothsch., *Cymothoe*, and two fine females of *Euxanthe tiberius* Gr.-Sm., and *Papilio dardanus* Brown, ♀ f. *lamborni* Poult., respectively. The bodies and antennae only were eaten.* The only others injured were a mantis and the head of another mantis that had been captured a week before but was not yet dry.

Some fifty bird-skins taken during the previous week were untouched, but one, which the native skinner had insufficiently poisoned on June 26, appeared to be attacked. This was a Guinea Fowl (*N. mitrata*), but, after the swarming ants had been shaken off it, I found that they had not touched the skin but were removing some maggots from the wings. Some 500 skins were in boxes which were not ant-proof, and these had not been molested at all.

Later in the day I saw a pleasing sequel to the affray between the Lesser Stink-Ants and Siafu; beneath the door-step at the opposite end of the house from that where the affray had taken place, a little heap of dirt and Siafu heads caught my eye. I therefore watched the entrance to the hole outside which it had accumulated, and presently a Stink-Ant came to the opening and dropped a Siafu head, presently another came with a bit of grit, then one with another head and so on. I took the liberty of removing this dump and found that it was only the Siafu soldiers that had been beheaded; the

* The remains of the above butterflies, except the *Cymothoe* and *Euxanthe*, were received—also the Hesperid *Tagiades flesus* F., referred to as eaten by the Siafu in a letter of 11. vii. 21. All bore the date 4. vii. 21. Both antennae of the *Salamis* and *Euphaedra* were present and one of the *Neptis*. The shrivelled eyes probably showed that the heads had been eaten out. The thorax (the only part of the body) of *Tagiades*, but not of the three with heads, appeared to be empty. The *Papilio dardanus* (left wings only) extended the range of the female f. *lamborni* over 100 miles southward (Trans. Ent. Soc. Lond., 1917, p. 335).—E.B.P.

workers' bodies were intact. I counted out a hundred corpses and estimated the remainder at seven hundred, which represented one day-and-night's work, as the Siafu had not reached the western end of the house forty-eight hours ago. Bravo the Stink-Ants! A society should be formed without delay for the "Preservation of the Stink-Ant in our East African Protectorates." At present their sole protection from evilly-disposed persons is the bad odour emanating from a trodden-on ant.

We were fully prepared for the 5 p.m. parade, and, as soon as it was going sufficiently strong, annihilated the line all along the wall with hot ashes, causing complete desertion of that track. On their issuing from a hole on the verandah floor, a charge of cyanide powder was put in and hot ashes heaped over it. Ashes and meat-bait were used freely between 8 and 11 p.m. whenever any ants appeared. Columns were smothered in cold ashes, although this is somewhat of a failure unless it is heaped too high for them to surmount; for though they will generally desert an ash-strewn track, they will nevertheless walk a clean path through the ashes if they very much wish to proceed that way.

July 7.—During the night the meat-baits were untouched in all rooms save one, where some three or four thousand were destroyed on the single bait. Whether my efforts had had anything to do with their desertion of the other rooms is open to doubt, as they had consistently worked through the house from east to west, taking the five rooms with their respective ceilings in order, except the enclosed verandah (on to which all rooms led) which they visited every night.

Whilst the interior of the house was refreshingly free from the foe, the immediate surroundings were little short of horrifying. On the north and west only a few thousand ants, perhaps 20,000, were entering their holes in the base of the house-wall. These belonged to the original force that arrived four days before. Within five feet of the house on the east (my attention being first attracted by the smell of dying bugs), thousands were on a Sisal (Aloe) plant, which harbours many creatures round its spear-protected base, and these refugees were now being murdered wholesale. We

heaped grass around and fired it. The sound of sizzling Siafu no longer moves me, and I can look upon a dying soldier ant with perfect equanimity.

Then came the shock. In every direction from east and south ants were arriving in countless thousands; they travel a great deal underground, passing from one hole over a couple of yards of surface and then down another hole, each entrance guarded by a massed ring of soldiers. Quite thirty of these steady streams were moving in the direction of the house.

We fired the grass extensively wherever they happened to be passing through it, heaped dried grass on all exposed lines and set fire to it, so that they all hastened below ground.

At 10 p.m. I searched the house but could not find a single Siafu, but whilst standing on the extreme east end of the verandah I could hear thousands of them in some dry grass thirty feet away. Taking an acetylene lamp I examined the broad path, but there were no visible tracks across it such as they usually leave, and I am convinced that they had reached their present position entirely by underground runs. As for the grass and bush, every blade and leaf was being systematically searched for prey; presumably the united forces of all the Siafu were in this tinder-dry vegetation. My enemy now lay entirely at my mercy, but, as it is easier to light a fire in Africa than to put it out, I had to let them go; for the belt of dry bush extended right away to some dry standing crops two miles off, and though there was no wind one might spring up at any minute.

One of the most striking things was the entire absence of Siafu from the house; not a single company had come for the abundant meat-baits which had been left for them; the discipline and organisation of the army were beyond reproach.

The effect of the search in the grass was to send a large number of plant-bugs flying to the light, so I am inclined to doubt whether the house was very much freer of them after a couple of days than it was before their visit. Geckos returned to their accustomed haunts, and their numbers do not seem to have suffered appreciably. I heard one or two bats in the roof reconnoitring, but do not know whether they have yet returned to roost.

July 8.—The Cocktail ants [*Cremastogaster castanea*, r. *tricolor*] have been unusually active the last three days and their numbers seem to have received reinforcements. Instead of solitary individuals going to the safe there is a regular procession coming and going as if they had learnt something from the Siafu.

Termites came up through the floor in an old place. I was hoping that they would have been wiped out by the Siafu, as the latter must have been in extensive occupation of their passages. I think that the effect of the invasion has been to keep them quiescent.

Summary.

Whilst Siafu undoubtedly do a lot of good in a house by ridding one of unwelcome insects, at the same time they drive off other insectivorous creatures—bats, geckos, jumping spiders, etc. If they continue to operate in the neighbourhood they may undo the good accomplished, by driving in fresh hosts of insects. Apart from this they might aptly be compared to a purging fire which without discrimination destroys foe and friend, and is on the whole too dangerous a remedy to call in.

The best method to combat them is to lay down hot ashes around the building before they enter, provided that there are no underground tunnels leading into the house, which, however, is generally the case in the tropics. Meat-baits undoubtedly destroy incredible numbers. The baits should be taken up every few hours and dropped into a bucket or basin containing water with a film of paraffin on the surface.

If water only is used many will crawl out, and apparently drowned ants, left in for twelve hours, will come round in another twenty-four.

Paraffin poured on a cement floor kills all that happen to be covered by it, but in an hour or two it will have sufficiently evaporated for them to recommence their peregrinations over the spot so treated.

A formalin solution (6 % was used) poured on a column passing along the base of a wall threw them into great confusion

and killed a few, but had no lasting effect, for they returned in a few hours.

I have been informed that sheep dip is most efficacious in keeping the Siafu away from a house.

Early stages of Osmylus chrysops.—Mr. C. L. Withycombe brought for exhibition a larva and adult of *Osmylus chrysops* L., with some enlarged photographs illustrating them, and made the following comments.

" Several larvae of this Neuropteron were taken a few weeks ago, at Sevenoaks, in moss on the margins of a small stream. They are amphibious in habits, living in wet situations and feeding mainly on Dipterous larvae. They are rather sluggish, but can walk quite rapidly. The mouth-parts are remarkable, being much elongated and almost straight. Each mandible is grooved internally, and against this the maxilla is pressed to form a sucking tube. The main difference of these mouth-parts from those of most other Neuroptera is that these sucking spears are curved slightly outwards instead of being caliper-shaped, and consequently cannot seize and hold a struggling insect. A small Chironomid larva ($\frac{1}{4}$ inch long) was offered to one specimen, which at once became very active and stabbed viciously downwards with its spears several times. After some misses it succeeded in piercing the Chironomid, and within fifteen seconds the latter, which had previously been very active, ceased to show any signs of life, although no appreciable amount of its blood had been extracted. It is therefore to be supposed that some very poisonous salivary fluid had been secreted by the *Osmylus*.

" A closely woven pale yellow cocoon is spun for pupation, of silk secreted from the anus."

Larvae of *Taeniorhynchus richiardii* Ficalbi, taken in Epping Forest on roots of *Typha ensifolia* in December 1921, were also exhibited.

The larva of this Culicid has the siphon modified for piercing the roots of aquatic plants from which it obtains its air supply.

A normal Culicine larva (*Finlaya geniculata*) was also shown for comparison, with a series of photographs showing the larva attached to aquatic roots and one illustrating the method of penetrating a root.

Papers.

The following papers were read :—

" The Mallophaga of the Oxford University Expedition to Spitsbergen," by Dr. J. Waterston, D.Sc., B.D.

" The Dasytinae of South Africa," by Mr. G. C. Champion, F.Z.S., A.L.S.

" A Monograph of the genus *Catochrysops*," by Mr. G. T. Bethune-Baker, F.L.S., F.Z.S.

" The Species of the Genus *Larinopoda*," by Dr. H. Eltringham, M.A., D.Sc., F.Z.S.

Wednesday, June 7th, 1922.

The Rt. Hon. Lord Rothschild, F.R.S., President, in the Chair.

Obituary.

The President announced the death of Mr. H. Rowland-Brown, M.A., formerly Secretary of the Society, and a vote of condolence with his relatives was passed.

New Member of Council.

The President announced that Mr. H. Willoughby Ellis, F.Z.S., had been co-opted on the Council in the place of the late Mr. Rowland-Brown.

Election of Fellows.

The following were elected Fellows of the Society :— Messrs. B. A. R. Gater, B.A., F.R.M.S., 13, Arundel Mansions, Kelvedon Road, S.W. 6; Lionel Lacey, Churchfield, Rodborough, Stroud, Glos.; Herbert Mace, Faircotes, Harlow, Essex; William H. Jackson, 14, Woodcote Valley Road, Purley; and Miss A. B. Flower, Eastbury, Surrey Road, Bournemouth West.

Exhibitions.

Transformational Deceptive Resemblance in Insects. —Prof. Poulton, referring to Mr. Uvarov's extremely interesting paper on the transition from Mimetic to Protective

Resemblance in certain Long-horned Grasshoppers (Trans. Ent. Soc., 1922, p. 269), said that the word " Transformational " expressed the author's meaning better than " Transformative "—the word actually used; inasmuch as the latter implied something preparatory or leading up to transformation rather than transformation itself. Such transitions have been known for a long time in those Mantidae which are at first ant-like and later on come to resemble leaves, etc.; also in ant-like and Sawfly-larva-like caterpillars becoming procryptic when older, such as *Stauropus fagi* and *Endromis versicolor*, and in caterpillars bearing terrifying eye-spots suggesting a Cobra-like snake, yet developing into well-concealed moths. Such well-known examples lead to the conclusion that the passage from Mimicry to Protective Resemblance in a single life-history was by no means uncommon.

H. W. Bates in his classical memoir on Mimicry did not separate these two categories, but, although they had much in common, it was inconvenient to treat them as one. By Mimicry an animal resembled another with Warning Colours, and in resembling it, became conspicuous (in Müllerian Mimicry better known by adopting Warning Colours in common with others in place of an independent advertisement), appearing to be something well known and disliked by its enemies: by Protective Resemblance an animal became concealed, appearing to be something passed by as of no interest to its enemies. The two categories had been grouped together as " Apatetic Resemblance " (with the substantive form " Apaté "), from ἀπατητικός deceitful, and defined as follows :—" Colours [including shape and attitude] which cause an animal to resemble some part of its usual environment, or which cause it to be mistaken for an animal of another species." *

Now that attention had been directed to these interesting examples of passage by a single individual from one category to the other, it was convenient to modify the terminology in order to include them. With the kind help of Prof.

* " Colours of Animals," Poulton, Internat. Sci. Ser., London, 1890, Table following p. 339.

A. C. Clark the terms "Metamorph-apatetic Resemblance" and "Metamorphic Apate" were now suggested as the technical equivalents of "Transformational Deceptive Resemblance." Just as "Metamorphosis" had been long used to express a well-known transformation of form and structure becoming visible at a change of skin, so here the same word was adopted to express a transformation with a special significance, also apparent at a change of skin.

Coccinella septempunctata L., as the prey of the Asilid fly Laphria flava L.—Prof. Poulton exhibited a female *Laphria flava* with its Coccinellid prey captured by Dr. Karl Jordan in the Harz Mountains, between Goslar and Hahnenklee (July, 1921),—one of many seen by him devouring the same species, at the time particularly common and conspicuous. A male *Laphria flava* with Ichneumonid prey —a male *Meniscus impressor* Gray (*Lissonotus* group of Pimplinae)—captured by Dr. Jordan at the same time was also exhibited.

These constant attacks on a conspicuous Coccinellid were an interesting addition to the evidence that Asilidae are some of the principal enemies of specially protected insects.

Kind help in the determinations had been given by Mr. G. J. Arrow, Major Austen, Mr. J. E. Collin and Mr. R. E. Turner.

Recent observations on the "false head" of Lycaenidae in relation to the attacks of enemies.—Prof. Poulton called attention to Dr. V. G. L. Van Someren's interesting observations recorded in Journ. E. Afr. and Uganda Nat. Hist. Soc., No. 17, Mar. 1922, p. 18. The appearance of a "false head" at the anal angle of the hind-wing of Lycaenidae had been recognised not by "one authority," as the author supposed, but by many, and independently of each other. A list up to 1906 is recorded in Proc. Ent. Soc. for that year (p. lii); and to this must be added T. R. Bell in Ent. Mo. Mag., 1906, p. 128, and J. Sibree in "Naturalist in Madagascar" (London, 1915, p. 254), quoted in Proc. Ent. Soc., 1917, p. lxv. And later still there are the important observations of Dr. Th. Mortensen in Taboga Island, Panama (abstract and reference in Proc.

Ent. Soc., 1918, p. xliv; see also Proc., 1919, p. xi). It is improbable that all the naturalists mentioned in the pages referred to were mistaken in the conclusion they arrived at independently. Furthermore, a lizard has been seen to be obviously attracted by the eye-spot near the apex of the fore-wing under surface of *Coenonympha pamphilus* L. ("Colours of Animals," London, 1890, pp. 206, 207; see also Trans. Ent. Soc., 1902, pp. 440, 441.)

Dr. Van Someren was inclined to reject the theory of the "false head" in favour of one which assumes simple conspicuousness and attractiveness in the colours and structures at the anal angle of the hind-wing under surface. This latter explanation has already been suggested for numerous Lycaenidae with tails "too large and conspicuous to resemble antennae"—species in which "the appearance of a 'false head' seems to have been to a large extent lost in the promotion of excessive conspicuousness" (Proc. 1918, p. xlviii).

In other Lycaenidae, however, the fine hair-like tails made to pass and repass each other by the eccentric movements, the associated eye-spots, and the outwardly bent lobe of many species, giving, as Dr. Mortensen wrote, "the most wonderful likeness to a real broad head," have, without doubt, been correctly interpreted as a head-like appearance, rendering a non-vital part especially attractive to vertebrate enemies. The difference between this and Van Someren's view is not great, for he also considers this part of the wing to be an area "of most attractability," although not head-like. The divergence is perhaps to be explained by the fact that he observed in the field and figured, in the plate facing p. 18 of his paper, many species with the "excessive conspicuousness" referred to above.

The existence of two or more eye-spots and tails in so many species, also well illustrated in Van Someren's plate, has for long been a puzzle, now for the first time explained by the author's observation that lizards, invariably approaching from behind, attacked sometimes from above, seizing the upper eye-spot and tail, sometimes from below, seizing the lower, sometimes directly from behind, removing part of both eye-spots. Attacks from all three directions were con-

vincingly illustrated on p. 20 of his paper. Another advantage appears to follow from the author's observation of repeated attacks on the same butterfly, viz. the existence of a second eye-spot and tail to direct a later attack when the first have been removed by an earlier one.

Lycaenidae that have been presumably seized by an enemy are often found to be more extensively injured on one side than the other, and this the author explains by an attack from behind and one side upon a butterfly with partially opened wings.

[Since the meeting on June 7, the specimens represented on his plate have been kindly forwarded by Dr. Van Someren. Prof. Poulton hoped to exhibit them to the Society at an early meeting in the autumn session. July 5, 1922.]

Symmetrical injuries to the wings of a butterfly bred in confinement.—Prof. Poulton exhibited a specimen of *Papilio machaon* L., bred at the Zoological Museum, Tring, May 22, 1922, from one of many pupae collected by Mr. J. Foster at Ranworth near Norwich. A symmetrical notch, like that produced by a bird's beak, had removed half the anal eye-spot of both hind-wings. The injury was probably inflicted upon the closed wings, when soft, by one of the other butterflies crowded in the breeding cage, perhaps by the hard costal margin of the fore-wing, and it was unlikely that such a cause would operate commonly in nature.

Prof. Poulton also exhibited an example of *Heodes phlaeas* L., with an unusually severe injury to all four wings. The butterfly had been taken, June 4, 1922, at Hogley Bog, Oxford, by Mr. A. H. Hamm, who observed the injury before effecting the capture. It was probable that the insect, at rest with wings upright, had been attacked, from behind and the left side, by a bird whose bill had cut a deep notch passing upwards through the anterior half of the hind-wings and invading with its apex the inner margin of the fore-wings.

The Ethiopian races of Heodes phlaeas L.—Prof. Poulton said that, since his communication of October 15 last year (Proceedings, p. lxxxi), he had been afforded the opportunity of studying an Abyssinian series in the British

Museum collection, and three specimens forming the type material of *H. pseudophlaeas* Lucas (1866) in the Paris Museum, kindly sent by M. le Cerf; also the complete series of *H. phlaeas ethiopica* Poult., kindly lent by Mr. J. J. Joicey.

H. phlaeas pseudophlaeas.—The Paris material included two males and one female. The only locality was "Abyssinia" on one male. The specimens are in good condition, but, compared with the more recent examples in the British Museum, are distinctly paler, a result probably due at least in part to fading.

The British Museum series, evidently of the same race as the above, consists of 6 males and 8 females with the following data :—

1902. Harrer ("Degen" on one example, "N. Deggen" on the other) : January 3—2 ♀.

1904. Managasha (these and the remaining Abyssinian specimens captured by Ph. C. Zaphiro) : October 24—1 ♂; October 26—2 ♂.

1905. Charada Forest, Kaffa (6000 ft.) : May 21—1 ♂; June 4—1 ♂; June 6—2 ♀; June 9—1 ♂.

1905. Codjeb River, Kaffa : May 26—2 ♀.

1905. Ella Couta (5000 ft.) : June 14—1 ♀.

1905. Totcha Kullo (8000 ft.) : June 18—1 ♀.

H. phlaeas ethiopica.—The Hill Museum series includes a specimen without locality labelled "Ex. Coll. Suffert 1912 : ? *H. abboti* : ? new : O. H. Schwarz"; also the following, all collected by Mr. T. A. Barns in the country to the N. and N.E. of Lake Tanganyika and around Lake Kivu :—

East of the north end of Lake Tanganyika, Urundi District, Upper Ruvubu River : July and August, 1919—1 ♂ 1 ♀.

The same district, Upper Akanjaru Valley (1400 m.) : August, 1919—2 ♂ 2 ♀.

North of Lake Tanganyika, Ruanda District, Lake Tshohoa : August, 1919—1 ♂.

North of Lake Tanganyika, Lake Kivu, Kissenji : September and October, 1919—2 ♂ 1 ♀.

N.W. Kivu, Lake Mokoto District (5000–7500 ft.) : September, 1921—2 ♂.

The data of the 11 specimens taken by Dr. G. D. H.

Carpenter to the north of the above-mentioned localities have already been recorded (Proc., 1921, p. lxxxi).

H. phlaeas ethiopica is therefore, so far as its distribution is known to us, an insect of high ground in and especially along the E. border of the southern section of the Western Rift Valley—the valley containing the Albert Nyanza, Tanganyika, and the lakes that lie between.

Comparison of pseudophlaeas and ethiopica with each other and with H. phlaeas phlaeas L.—These two African geographical races are very closely allied to each other and to *H. phlaeas phlaeas* L. Before comparing them it will be convenient to quote the brief description of *pseudophlaeas* by H. Lucas in Ann. Soc. Ent. Fr., 1865, pp. 499–500, and contained in the following Note (2) :—

" Cette variété, par la teinte pâle constante de ses ailes, par l'échancrure du bord terminal qui est à peine marquée et par l'angle anal qui est terminé en une queue assez prolongé, doit former une espèce nouvelle. . . ."

Furthermore it is stated on p. 499 that the Abyssinian examples " sont très-remarquables par la teinte pâle de leurs ailes en dessus et en dessous."

As regards the under surface this statement is incorrect; for the pale grey ground-colour in a large proportion of the individuals of *phlaeas* is much lighter than the reddish ground of *pseudophlaeas* and further still from the deeper tint of *ethiopica*. There are, of course, dark grey examples of *phlaeas* for which Lucas' comparison would hold.

On both upper and under surfaces *ethiopica* is a darker insect than *pseudophlaeas*. This is true of the black as well as the red. In addition to this general distinction there are certain differences in details, some of which appear to be constant while others only hold for the majority of the known individuals of each race.

Fore-wing Upper Surface.—The black spot near the anal angle, and extending, when well developed, from vein 1 to 2, is inwardly concave (viz. towards the base of the wing), outwardly convex, in all known examples of *ethiopica*, the character being generally strongly although sometimes very slightly marked. In *pseudophlaeas* the outer margin of the

spot is concave or straight, the inner convex or straight. Not one of the specimens resembled *ethiopica* in this respect.

The shape of this spot shows great variation in *phlaeas* of the Northern Belt, but the concavity is more generally outward than inward and therefore more often like *pseudophlacas* than *ethiopica*. The spot is often rectangular, rhomboidal, or more or less deformed; frequently shows a tendency, generally more strongly marked on the under surface, to become double; sometimes completely splits into two. The form of the spot could probably be shown to vary geographically if sufficient material were available. Thus an interesting form with radiately drawn out F.W. spots, occurring year after year (Strecker) in a limited area in Massachusetts, has the spot double in four out of five examples in the British Museum. Indications of division are also distinct in radiate forms from Maine, and in two out of four of the form *americanus* D'Urban, in the same collection.

Out of eighteen examples collected in the Chusan Islands, E. China, by Commander Walker (11 in British Museum, 7 in Hope Dept.) the great majority have the spot curved inwards as in *ethiopica*; in one it is very large and rhomboidal, in four hourglass-shaped, a distinct indication of its double nature still more clearly expressed on the under surface of these and others of the series.

As regards this character *H. abboti* is nearer *pseudophlaeas*, 10 out of 48 in the Hope collection having an outwardly curved spot, 6 an inwardly. Generally the spot is long and narrow with straightish sides and often more or less constricted, sometimes actually divided. It is also often relatively small, thus approaching the S. African *H. orus* Cram., in which it is often absent and always small as compared with the rest of the series, although, in spite of this reduction, it is divided in 5 out of the 34 specimens in the Hope Department. The 19 examples of *abboti* in the British Museum resemble the Oxford series in this character.

The Form of the Hind-wing.—The almost complete disappearance of the "échancrure," or bay between the anal angle, often becoming an anal tail, and the small "tail" commonly present in *phlaeas* (the tail into which vein 2 is

prolonged), is caused by absence of this latter feature in *pseudophlaeas*. The second tail is also generally wanting in *ethiopica*, although a vestige exists in some few individuals, as also in a few *abboti*. In *phlaeas* this tail is an extremely variable feature, which, strangely enough, is especially strongly developed in many examples from localities near Africa, viz. Asia Minor and Cyprus. The prolongation of the anal angle of the hind-wing, described by Lucas, also occurs, although to a less extent, in *ethiopica* and *abboti*.

The Hind-wing Upper Surface.—The scalloping of the inner border of the marginal band, due to the prolongation of the red inwards along the veins, is more strongly marked in *ethiopica*, although in a single example from Kigezi the border is as plain as in any *pseudophlaeas*.

The coppery lustre of the black surface within the band is, on the average, more strongly developed in *pseudophlaeas* which to this extent approaches *abboti* more nearly than *ethiopica*.

The relative degree of development of the well-known inter-nervular blue spots, along the inner border of the marginal band, is perhaps the most interesting difference between *ethiopica* and *pseudophlaeas*. At first sight, this feature seemed to be entirely wanting from the Abyssinian series, but careful examination with a lens showed that the largest spot was represented by 6 or 7 scales in one male, by 3 or 4 in a second, and the only spot by a single scale in a third. No trace was found in the Paris specimens nor in any Abyssinian female.

Ethiopica, on the contrary, always possessed the feature, generally strongly developed. The single male, formerly supposed to be without it (Proc., 1921, p. lxxxii), was found to possess 5 blue scales in one space on the right side. In the southern examples from the Hill Museum this feature was on the whole more strongly developed than in those from S.W. Uganda, although strongest of all in one of Dr. Carpenter's males from Kigezi.

A study of *phlaeas* would probably show that this character also varies in development in different parts of the Northern Belt.

The Hind-wing Under Surface.—Ethiopica is, on the average, of a darker reddish colour than *pseudophlaeas* and has darker and more pronounced dusky internervular markings just inside the marginal red band. The more basal dark spots vary greatly in both races, being sometimes distinct, sometimes evanescent in both. In the tint of the under surface *abboti* appears to be somewhat nearer to *pseudophlaeas*.

The fine central line of a deeper red which traverses the marginal band and is composed of a curved section, outwardly concave, in each space, is far more distinct in most examples of *ethiopica* than in any of *pseudophlaeas*, in which indeed it is generally very indistinct. The band itself is also less strongly marked in *pseudophlaeas*—especially so in the two Paris males—thus giving to the under surface a more uniform appearance than that of *ethiopica*.

The Under Surface of the Abdomen.—This surface varies greatly in tint, but it is, on the average, paler in *pseudophlaeas*, and, in a larger proportion of individuals, white, than in *ethiopica*.

Comparison between the Northern and Southern ethiopica.—The differences were extremely slight and only recognisable by the study and comparison of the whole series from each area. On the average the red marginal band of the hind-wing was slightly broader in the south, and, on the under surface, the fine central deep red line traversing this band was brighter and more sharply defined. The under surface as a whole was very similar but slightly brighter in the south. There was no perceptible difference in the shade of red in the fore-wing or in the basal iridescence, sometimes spreading over the whole of the black area, in the hind.

Pseudopontia paradoxa Feld.; its bionomics, geographical races, and affinity.—Prof. Poulton said that he had recently received a collection of Lepidoptera made in July 1921 in the Semliki Valley by his friends Mr. C. A. Wiggins, P.M.O. Uganda Prot., and Dr. G. D. H. Carpenter, D.M. The precise locality was the Buamba Forest in that part of the Semliki Valley which lies west of the north end of Ruwenzori and in British territory, viz. Toro, Uganda. The elevation was about 3000 ft. and the position about

30° 5′ E. and 0° 45′ N. The forest was the extreme eastern edge of the great Congo Forest which stretches westward to the sea, and was of much interest in that it afforded the passage between the typical conditions in that great Sub-region (the 2nd or West African of Wallace) and the open country and scattered forests of Uganda.

A collection made by Dr. S. A. Neave in this locality, November 3–7 (Dry Season), 1911, showed that there was a most interesting transition between some of the West African butterflies and their Uganda races, and it was confidently believed that the locality would well repay further study, especially if undertaken in the Wet Season. The weather on the selected dates—July 21 to 31—was unfortunately too wet and collecting was much hindered by rain and clouds. The expenses were defrayed from a fund for the study of evolution presented to the University of Oxford in Prof. Poulton's name by his friend Prof. James Mark Baldwin.

1. *Pseudopontia and the Pierines associated with it in the Semliki Valley.*—The collection contained 39 examples of *Pseudopontia,* while Mr. Wiggins's and Dr. Carpenter's letters told something of its habits and appearance in life.

Bearing in mind the wide differences of opinion concerning this remarkable insect—formerly considered by British entomologists to be a moth, by certain authorities to be altogether outside the Lepidoptera, and by Aurivillius to belong to " the most peculiar of all known genera of butterflies " (Seitz's " Macrolepidoptera," xiii, p. 30)—it seemed well to publish these recent observations as soon as possible, together with any further results which might be yielded by the study of the specimens.

Dr. S. A. Neave, Dr. R. J. Tillyard (who, on his visit to this country in 1920, had been persuaded to take material for examination), Dr. F. A. Dixey, F.R.S., and Dr. H. Eltringham have kindly contributed the sections which follow their names, and the results entirely support the conclusions of those naturalists who have maintained that *Pseudopontia* is an aberrant Pierine butterfly.

The following observations recorded in the letters referred

to above, and the collection itself, strongly confirm Dr. Dixey's hypothesis (Proc. Ent. Soc., 1906, pp. lxix, lxx), brought forward many years ago, of mimetic association between *Pseudopontia* and *Nychitona medusa*, as also Dr. Neave's previously published observations (Proc. Ent. Soc., 1908, p. xiii), amplified in his section of this communication.

From Mr. C. A. Wiggins, November 27, 1921.—" *Pseudopontia* [described as common in a letter of July 31] certainly occurred with other Pierines and especially *N. medusa*. The flight is very slow and very like *N. medusa*. I don't think I saw it settled. It was a perfect nuisance in the net as it bent its wings over so, bending them in the middle as I've never seen any other butterfly do, thus——"

The accompanying sketch showed the wings bent over ventrally so far as to be nearly parallel, the bend or false hinge being near the base but separated by a considerable interval from the true hinge.

From Dr. G. D. H. Carpenter, July 30, 1921.—" Pierines also seem scarce. The commonest is *Belenois solilucis* Butl., next *Leuceronia thalassina* Boisd., of the large ones, but *Nychitona medusa* Cr., and *Pseudopontia* are fairly abundant. The latter I had not met before, and quite overlooked it (probably not distinguishing it from *medusa*), until I found one in one of the boy's papers and was at once struck by the transparent appearance and curious venation. I have soon learnt to distinguish it from *medusa*, but its manner of flight closely resembles that of the other. It looks, however, much more transparent and slightly green. *Leuceronia pharis* Boisd., and a few *Pinacopteryx* and *Phrissura* also occur."

November 6, 1921.—" *Pseudopontia* in every way was much like *Nychitona*. It flies with it and settles with wings apposed. I don't think I have found it in position of permanent rest."

[Received from Dr. Carpenter since the meeting.]

June 10, 1922.—" I do not think that anyone who had often seen *Pseudopontia alive* could have much doubt as to its butterfly nature."

The table on p. lx, recording all the examples of the three species of this association, contained in the collection, proved

their occurrence and flight together on several days. It is probable, however, that *Nychitona*, with which both naturalists were very familiar, was proportionately commoner than the captures indicate.

The 26 examples of *Nychitona* were somewhat sharply separable into a larger form with an expanse of $1\frac{1}{2}$ to $1\frac{3}{4}$ in., and a smaller form of about $1\frac{1}{4}$ in. Both lacked the spot in the fore-wing. The larger appeared to be a small variety of *N. medusa* f. *immaculata* Auriv., and, from the form of the apical black margin to the fore-wing, five males of the smaller form (taken July 23, 27 and 28) also appeared to be *immaculata*. Judging from the same feature, the two remaining males resembled *N. alcesta* Cr., f. *nuptilla* Auriv., but were smaller, while the two females, entirely without the black apical margin, appeared to belong to them. These females resembled *nupta* Butl., as figured by Aurivillius (Seitz's "Macrolepidoptera," xiii, pl. 10*b*), but were smaller. The two males, coming from the locality of *nuptilla* (Ruwenzori), are almost certainly this form, and the two females may be the same, or the form described by Butler, although here the locality was Angola. Aurivillius, on p. 31 of the above-mentioned work, speaks of *nupta* as entirely white, but Butler (Cist. Ent., Vol. i, p. 175) describes the apical edge of the fore-wing as "slightly dusky," and, this being so, it does not seem to be distinguishable from a pale-edged *nuptilla*. The distinction between *medusa* and *alcesta*, or between any other different species that may be supposed to exist in the varied African forms of *Nychitona*, requires for its establishment a structural or genetic foundation, and, until this is supplied, the extent of variation and transition suggests that they should all be regarded as forms of Cramer's *medusa*.

As regards the mimetic association, the larger forms in the following table would resemble in size the majority of *Pseudopontia*, while the black apical margin, invisible in flight and merely causing the insect to appear somewhat smaller, would not become a distinguishing feature. The smaller forms of *Pseudopontia* would similarly resemble the smaller ones of *Nychitona*.

It should be mentioned that the collection also contained an association of white, black-tipped, day-flying moths grouped round an abundant Lymantrid model. This association probably entered into mimetic relationship with that centred by *Nychitona*.

Dates in 1921.	*Nychitona medusa*.				*Leuceronia pharis*.		*Pseudopontia paradoxa*.*	
	Larger form.		Smaller form.					
	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
July 21	1		2	1				
,, 22	2					1		
,, 23	1		1					
,, 24	1	1		1	1			
,, 25	2	2				1	1	
,, 27		2	2				10	1
,, 28		2	2		3		7	
,, 29		2			1		5	
,, 30					1		3	
,, 31		1				1	6	
Totals	7	10	7	2	6	3	32 + 1 †	1 + 3 †

2. *The Distribution and Occurrence together of Pseudopontia and its Pierine Associates*, by Dr. S. A. Neave.

As regards my own personal experience of the three butterflies in question, perhaps the most interesting points connected with them are their distribution and relative abundance. *Leptosia* (*Nychitona*) *medusa* is, of course, very common and widely distributed in Africa. It is by no means confined to

* The total captured was 39 of which one has been mislaid, one taken July 25 is without abdomen, while of four dissected specimens taken July 28 (1), July 29 (2), and July 31 (1), three are females and one a male. These latter four are therefore added to the totals in the table.

† See the above note.

forest, and may occur in comparatively thin bush. *Pseudopontia paradoxa* seems to be limited to the Western Equatorial faunistic region of Africa though it occurs nearly up to the extreme edges of it. I have taken it in South-west Katanga not very far from the Congo-Zambesi watershed, and in Uganda it is not uncommon in forested country as far east as the forests at the western and southern foot of Mt. Elgon. Though a forest species, it is not rigidly restricted to dense forest and deep shade. *Leuceronia pharis* is a typically dense forest insect and never occurs outside such a habitat. It has a relatively short season on the wing, and is usually fairly abundant where it occurs. It is found in dense forest areas across Uganda into Kenya Colony as far east as the foot of the Nandi Escarpment. Both *P. paradoxa* and *L. pharis* have the same sluggish, floating flight as *L. medusa*. This is particularly striking in the case of *L. pharis*, in view of the active and vigorous flight of its allies.

3. *Pseudopontia paradoxa; its Affinities, Mimetic Relations, and Geographical Races.*—Dr. F. A. Dixey said that he had been asked to supplement Prof. Poulton's communication with some remarks on the structure and probable affinities of this curious and isolated form. It was first described by Felder (Pet. Nouv. Ent., i, No. 8 (1869), p. 30) in the year 1869, from a specimen captured at Calabar. He considered it to be a Pierine allied to *Pontia* (*Nychitona* Butl.). His name for it was *Globiceps paradoxa*.

In 1870 Plötz (Stett. Ent. Zeit. (1870), pp. 348, 9, Taf. III (sic), fig. 1 *a–f*. N.B. The plate itself is numbered Taf. II) described and figured *Pseudopontia calabarica*, which Hewitson (Pet. Nouv. Ent., No. 15 bis and No. 23, 1870) rightly pointed out to be the same insect as Felder's *Globiceps paradoxa*. Hewitson went on to say that the insect was evidently a moth, and to criticise Plötz's figure on the ground that the artist had represented the antennae as knobbed, thus giving it the deceptive appearance of a butterfly. In his opinion that it was a moth, he was followed by Butler (Cist. Entom. i (1870), p. 57). R. Felder (Pet. Nouv. Ent., No. 24, 1870) replied to Hewitson's strictures by publishing an accurate figure with the antennae knobless, as in nature. He gave

reasons for considering it to be a butterfly, and maintained that all its characters approximated it to the group of Pieridae, especially mentioning its bifid claws, a well-known Pierid character.

The venation, palpi, claw and scales were figured by Schatz (Exotische Schmetterlinge, ii (1885–6), p. 65; Taf. 4, *a–e*), who had no doubt that *Pseudopontia* is a true Pierine; placing it between *Pontia* and *Leucidea*. Speaking of the venation of the hind-wing he says that "the costal and subcostal apparently cross one another." This condition is represented in his figure, as it was still more distinctly in the original figure of Plötz. What the real condition is will be shown later.

Aurivillius (Rhop. Aethiop. (1898), p. 386) considered it to be unquestionably a butterfly, and in his book on African Rhopalocera includes it among the Pierines, putting it just before *Leptosia* (*Nychitona* Butl.).

Pseudopontia was submitted to a careful examination by Enzio Reuter (Ueber d. Palpen d. Rhopal. (1896), p. 228). He pointed out that the palpi are quite different from those of all other Pierines, recalling those of *Hepialus* and in his opinion probably representative of a very old type. On the other hand, he says, the "basalfleck" corresponds fairly well with that of some genuine Pierines, but it again is of very primitive development. The isolation of *Pseudopontia* is shown also by its neuration and its moniliform, clubless antennae. He sees no intimate relation between *Pseudopontia* and other Pierines; but, on the other hand, he finds no specific Heterocerous character. The antennae are Rhopalocerous. On the whole, especially as the venation does not absolutely defy comparison with that of some genuine Pierines, Reuter inclines to consider it as a subfamily of equivalent rank to the "Pieridinae," believing it to be probably a survival of an ancient, long-extinct stem.

Grote (Proc. Amer. Phil. Soc., Vol. xxxvii (1898), pp. 40, 41; Entom. Rec., x (1898), pp. 213–215) began by acquiescing in the view that it was a Pierine, but afterwards placed it among the Hesperids, adding that it had "nothing to do with Papiliones."

Dr. Jordan has shown that the antennae, in spite of their clubless condition, are certainly Pierine (Nov. Zool., v, 1898, pp. 376, 382, Pl. xiv, f. 28).

A curious point remains. Aurivillius, both in his own book and in Seitz's "Macrolepidoptera," has included in the genus *Pseudopontia* a second supposed species, *Pseudopontia cepheus* Ehrm., but in each case with a caution that it may not belong to this genus. The original description by Ehrmann leaves little doubt that his insect, which came from Grand Sess in Liberia, is a *Nychitona*, and not a *Pseudopontia* at all.* In our Proceedings for 1906, pp. lxix, lxx, speaking of *Pseudopontia paradoxa* and *Nychitona medusa*, I said, "It may well be anticipated that future observation will show their likeness in appearance to have a mimetic significance." From what has been said, it seems likely that the deception has at any rate been successfully exercised upon a human expert. Another confirmation came from Dr. Neave's observations in the field. In 1907 he wrote, "the two forms inhabit exactly the same localities and are barely distinguishable from each other on the wing" (Proc. Ent. Soc. Lond., 1908, p. xiii). It may be worth mentioning that Dr. G. D. H. Carpenter, writing in 1915, speaks as follows concerning *Leuceronia pharis*, a butterfly which I considered (*loc. cit.*) to belong to the same mimetic combination: "*L. thalassina* (both ♂ and ♀) frequently assembles to drink at moist spots, often almost entirely by itself, but sometimes mingled with others, whereas *pharis* is purely a flower-frequenter. In my own mind I had put it with *Nychitona medusa*; its whole appearance and feeble build and manner of flying suggested close relationship to *medusa*" (Proc. Ent. Soc. Lond., 1915, p. xcvii). Dr. Neave's and Dr. Carpenter's conclusions are confirmed and *Pseudopontia* shown

* Ehrmann's description is as follows: "Male—Upperside of all the wings pure white; apex of primaries has a sharp cut square black spot, and in the sub-apical space there is a medium-size black triangulate spot. Underside of primaries, the ground-colour is the same as above with the markings on the apical and sub-apical space faintly reproduced; the basal space is slightly shaded with pale green, marbled with faint black striae. Expanse, 1¾ inch. Types from Grand Sess, West Africa." *Journal of New York Ent. Soc.*, vol. ii, No. 2, June, 1894, p. 77.

to be a member of the same association by the table of captures printed on p. lx.

For the reasons already stated, it seems improbable that Ehrmann's *cepheus* is a second species of *Pseudopontia*. It is nevertheless the case that there are two geographical forms of *P. paradoxa*, which may perhaps deserve to rank as subspecies. These two forms, so far as I have observed, show a constant though slight difference in venation. In all the specimens that I have examined from Sierra Leone and Nigeria, the costal and subcostal veins of the hind-wing are united either by direct contact, or by a connecting bar (Plate B, fig. 7). The same condition obtains in all Dr. Carpenter's specimens from Uganda. But in every example from the Luebo district (Kassai river) in the southern Congo, the two veins are separated by a distinct interval, running parallel with each other for a short distance, but never joining (Plate B, fig. 6). My friend Dr. Eltringham has kindly mounted for me a hind-wing of each kind, with the veins stained to show the difference; these will be thrown on the screen.

On the whole, we seem to be justified in saying that *Pseudopontia*, though clearly an isolated form, shows more correspondence with the Pierinae than with any other subfamily. The discovery of its immature stages, which are at present unknown, would no doubt settle at once the question of its affinities.

Pseudopontia paradoxa australis subsp. nov.—Differs from typical *P. paradoxa* Feld., only in the fact that the costal and subcostal veins in the hind-wing are separated by a distinct interval, running parallel with each other for a short distance, but never joining. The same two veins in typical *P. paradoxa* are united, either by direct contact, or by a connecting bar.

Southern Congo, Kassai River, Luebo district.* Types, ♂ and ♀, in Hope Collection, Oxford.

* A single specimen in the Hope Collection bears the label "Camaroons; Rutherford. Hewitson 1874." The data require confirmation before they can be accepted as beyond doubt.

Explanation of Plate B.

Pseudopontia paradoxa.

Fig. 1. Extremity of ♂ abdomen (semidiagrammatic) showing armature *in situ*.

2. Armature dissected out, side view.

3. ,, ,, ,, ventral view.

4. ,, ,, ,, dorsal view, showing the lobe-like expansions above the claspers.

5. Egg, drawn from examples removed from bodies of dried specimens.

6. Neuration of hind-wing of Southern Congo examples.

7. ,, ,, ,, ,, examples from other localities.

8. ,, ,, fore-wing (not differing in different localities).

(Note the swollen condition of the basal part of median nervure, in both fore- and hind-wings.)

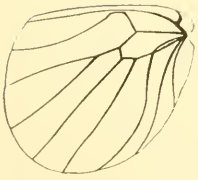
1.

2.

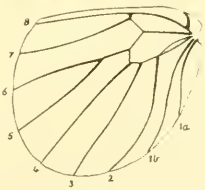
3.

5.

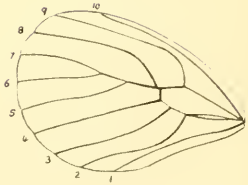
4.



6.



7



8

H. ELTRINGHAM del

PSEUDOPONTIA PARADOXA

4. *Is Pseudopontia a Pierid, or What?* by Dr. R. J. Tillyard.

[From the letter accompanying Dr. Tillyard's note.]

Cawthron Institute,
Nelson, N.Z.
March 6, 1922.

After recovering from my accident, I went for a trip to Australia last October, and took two specimens of *Pseudopontia* with me for my friend Mr. G. A. Waterhouse. He examined them and declared at once that they were certainly *not* Pieridae, but he would not give detailed reasons; only said that they were extraordinary beasts, not belonging to any known family. I concurred at the time, thinking he must surely be right, but before writing to you, I set down carefully the best definition of a Pierid I could find, and tested *Pseudopontia* by that definition. I was surprised, and rather pleased, to find that this careful test shows your butterfly to be *in every respect* what it looks, viz. a true Pierid. The argument is set forth fully in another sheet enclosed herewith [printed below].

I would say that this butterfly is the most highly specialised Pierid I have yet set eyes on, and I anticipate that its larva and pupa will show true Pierid characters.

[In the account printed below Dr. Tillyard uses his new notation developed from that of Comstock and Needham. By means of the numbers in parentheses his terms can be followed on figs. 7 and 8 of Plate B.]

To answer the question " Is *Pseudopontia* a Pierid? ", we have first of all to ask : What constitutes a Pierid? Leaving out of account the early stages, which are unknown, but which, if known, would certainly solve the problem, we may define a Pierid by the following characters :—

Antennae close together at bases. Front pair of legs perfect in both sexes. Hind tibiae with terminal pair of spurs only. Fore-wing with one or more branches of Rs (7–9) stalked beyond the cell. Hind-wing with precostal spur present, but no closed precostal cell; also with vein 3A (1*a*) present.

Applying these tests, we find that *Pseudopontia* possesses

every single one of the above characters exactly. *Therefore it is a true Pierid.* Its peculiarities are all of less than family value, and suggest at the most that it might form a separate subfamily Pseudopontiinae [as adopted by Prof. Aurivillius in Seitz]. It is remarkable for the following characters :—

(*a*) The strong curving of R_1 (9 in F.W., 7 in H.W.) in both wings, and, in the hind-wing, the failure of R_1 (7) to continue coalesced with Sc (8) distally. A parallel to this can be found in some male Psychidae. Normally, Sc (8) and R_1 (7) are fused distally in all Heteroneurous hind-wings. Separation is not an ancestral character here, but is due to enlargement of the area of the wing served by these two veins.

(*b*) The smallness and narrowness of the cell in both wings.

(*c*) The completion of the precostal spur in hind-wing to the wing-margin (most Pieridae have it stopping short of the margin).

(*d*) The extraordinary manner of forking of the branches of Rs (7–9) in fore-wing, together with loss of two branches. (*Delias* and other genera have lost two branches, but the manner of branching is altogether peculiar).

(*e*) Most of the wing-scales are very highly specialised, of a deeply bifid type, with normal scales interspersed.

I think the characters (*a*)–(*d*) indicate descent from a smaller-winged form with normal-sized cell for such form, with sudden evolution of a larger and more rounded wing by expansion of the area beyond the cell. I anticipate that the larva and pupa will show normal Pierid characters.

5. *On the Male Armature and the Egg of Pseudopontia paradoxa*, by Dr. Harry Eltringham.

The armature of *P. paradoxa* is of a peculiar structure unlike that of any other species known to me. Plate B, fig. 1, shows the apparatus *in situ*, whilst figs. 2, 3, and 4 show different aspects of the organs dissected out from another specimen.

The uncus is short, broad and slightly bifid. The claspers are of characteristic shape, and just below the point where the oedeagus is extruded they are heavily chitinised and

slightly dentate, whilst anteriorly to this dentate portion is a flat brush of modified scales.

Internally and on the dorsal side of each clasper is a delicate membrane swollen out into a kind of lobe. The saccus or vinculum is slender and unusually long, as is also the oedeagus shown in all the figures.

The whole structure of these organs gives no clue to the systematic position of the species. In my opinion the structure of the male armature is rarely to be relied on as an indication of more than specific affinity. Reference to the figures of the male armatures of the Genus *Acraea* (Trans. Ent. Soc., 1912, Plates VII to XV) will show that so great is the variety of structure, it would be impossible to describe a typically Acraeine form of genitalia.

The Egg.—By softening bodies of female examples in caustic potash, it was found possible to dissect out a few eggs in various stages. None of these seemed to be quite mature. The shape of the most advanced could be more or less restored by mounting in fluid, whilst the external structure could most easily be seen in dried examples, though these were, of course, much shrivelled.

Fig. 5 is a drawing made up from both moist and dried examples and probably gives an approximate idea of the shape and appearance of an almost mature egg. It has nine longitudinal ribs ending in slight projections at the narrow or upper end, whilst there are faint indications of horizontal lines between the longitudinal elevations. Though not typically Pierine in form it at least resembles the eggs of that family more than those of others so far as they are known to me, and to that extent supports the view that *P. paradoxa* is an aberrant Pierine species.

New and Rare Lepidoptera.—Mr. G. Talbot exhibited the following Lepidoptera on behalf of Mr. J. J. Joicey.

Africa.—A new species of *Charaxes* from W. Kivu, collected by T. A. Barns at 8500 feet; allied to *lasti* Smith.

A new subspecies of *Pieris brassicoides* Lucas, collected by T. A. Barns, in the highlands of the Great Craters, Tanganyika Territory, between 7500 and 8800 feet. The species was hitherto known only from Abyssinia.

New Guinea.—Collected by Messrs. Pratt, in the Weyland Mountains.

Panacra excellens Roths., a very distinct species, obtained at 2000 feet.

Eucocytia meeki Roths. A ♂ obtained at 6000 feet. Sir G. Hampson created the family Eucocytiadae, for this and *Cocytia*, but there is strong reason for thinking that these insects are Noctuids or Agaristids. A detail not referred to in the original description of *Eucocytia* is that of the possession of a thick tuft of androconia-like scales below the anus on the ventral surface. Also the valves are furnished with hair of a carmine colour on the outer side.

Lord Rothschild has suggested that this subfamily should really come after the Mominae in the Noctuidae.

Among Zygaenids, three new species of *Eusphalera* and one of *Pidorus* were obtained.

S.W. Sumatra.—Taken by Messrs. Pratt on Mount Korintji.

Papilio payeni ciminius Fruhst., ♂ at 5000 feet, ♀ at 2000 feet. The female was previously unknown. This race is nearest the Java form.

Pyrameis samani Hag. Obtained at 7300 feet. Until the expedition of Robinson and Kloss this species was only known by two specimens. That expedition obtained a series, as also did Messrs. Pratt.

A species of *Psaphis* that may be a new form. These Zygaenids strongly resemble Geometrids of the genus *Dysphania*. Obtained at 7300 feet.

Central Ceram.—A new race of the Zygaenid, *Aglaope hemileuca* Roths. This species was only known hitherto from New Guinea. A specimen is shown illustrating a black aberration. This race differs in the position of the black discal band and in the position of vein 7 of the fore-wing. Obtained at 3000–6000 feet.

Sumbawa. A new *Charaxes* allied to *C. nitebis* from Celebes, but very distinct. One ♀ specimen which was taken by W. Doherty and has remained many years in Mr. Elwes' collection.

Papers.

The following papers were read :—

" Elateridae of Seychelles Expedition," by M. Fleutiaux, communicated by Dr. H. Scott.

" Transformative Deceptive Resemblance in Long-horned Grasshoppers," by Mr. B. P. Uvarov.

Wednesday, October 4th, 1922.

Mr. Robert Adkin, Vice-President, in the Chair.

Obituary.

The deaths of the following Fellows were announced, and a vote of condolence with their relatives was passed : Dr. David Sharp, F.R.S., one of the Special Life Fellows of the Society, Mr. Hamilton H. Druce, Mr. Arthur Horne, Mr. Frank M. Littler, and Mr. G. O. Sloper.

The Collection of Portraits.

The Treasurer made a statement as to four new portraits that had recently been hung in the Meeting-room, and a portrait of the late Dr. Sharp presented by Mr. W. J. Lucas, for addition to the collection, was gratefully accepted.

Election of Fellows.

The following were elected Fellows of the Society :—Messrs. Guy Babault, 10, Rue Camille-Perier, Chaton, Seine-et-Oise, France; Albert E. Waight, Brunleigh, Kent Bank Road, Grange-over-Sands.

Exhibitions.

Insects from the Farn Collection.—Mr. W. G. Sheldon exhibited an example, taken in the New Forest, of the very rare type form of *Sarrothripus revayana* Scopoli, or very near it, with an example of *S.* ab. *ramosana* Hb., for comparison; also an example of the very rare (in Britain) ab. *degenerana* Hb., of the same species. Of this form he knew of three examples

purporting to be of British origin : the one exhibited, labelled " Chattenden," one reported to have been taken in the New Forest by the late E. Morris, which is presumably now in the collection of Lord Rothschild, and one originally in the Howard Vaughan Collection, later in that of S. Webb, disposed of at the sale of his collection, and the present location of which is not known.

Mr. Sheldon also exhibited five examples of *Acrobasis tumidana* Schiff., from Darenth Wood, 1873–5, with the nearest related British species, *A. zelleri* Rag. = *A. tumidella* Zk., for comparison.

The procryptic resting attitude of Polygonia c-album L. and certain allied species.—Prof. Poulton exhibited a living specimen of *P. c-album* captured by Commander Walker at Oxford a few weeks earlier. He called attention to the out-turned edges of the wings in the resting position, as described in Proc. Ent. Soc., 1922, p. xix. The exhibited individual had been watched daily by Mr. A. H. Hamm, who observed that in darkness the fore- and hind-wings were only separated by a narrow chink passing inwards from the strongly marked bay formed by the hollowing of both approximated angles. When exposed to diffused daylight the fore-wings were very slowly moved forward until the narrow chink became a wide gap. In direct sunlight, or as the result of a shake or jar, the change of attitude was made comparatively rapidly.

Dr. R. C. L. Perkins, F.R.S., wrote on September 29 that he too had " noticed that raising or separation of the front from the hind-wing in *c-album*, and not only in this but in the ' Tortoiseshells ' and I think in other Vanessas. They also do this when disturbed during hibernation."

In the latter Vanessids it was probable that the change of attitude was a preparation for flight—impossible when the costal margins of hind- and fore-wings lay one over the other, as in the resting position for which the under surface pattern was adapted. In such species the change of attitude necessary for flight detracted from the procryptic significance by exposing the part of the fore-wing covered by the hind when the resting butterfly was undisturbed.

C-album offered an interesting contrast in this respect,

for the changed attitude tended rather to enhance the effect by increasing the resemblance to a tattered and weather-beaten fragment of dead leaf. The exposed parts of the advanced fore-wings harmonised with the rest of the pattern, while the wider gap apparently added to the procryptic effect of the jagged margin. It was likely that change of attitude in *c-album* was originally a preparation for flight now utilised in an exaggerated form as aid to concealment.

[*Note.* October 18 :—Since the last meeting the exhibited butterfly had been placed in a dark cellar. When examined on October 17 it was observed that the fore-wings were drawn back so far as to close the narrow chink altogether. The butterfly was undisturbed, but the light or perhaps heat of the candle, held at six or eight inches distance, at once caused a very gradual movement forward of the fore-wings and the formation of a narrow cleft. The observation was only continued for a short time, but it was hoped that future investigations would determine whether there was normally a diurnal change of attitude in these butterflies when exposed to normal daylight and darkness during hibernation.]

Concerning the interpretation of the movement in *V. urticae*, as a preparation for flight, Dr. Perkins wrote on October 2 :—

" It may be, as you say, with regard to *urticae*. I think they often raise the front wings without actual flight taking place in the circumstances I have mentioned, but it may be done with a view to flight, as sometimes it is a preliminary to the wings being spread open. These may then be closed again without flight taking place.

" Of course ' Meadow browns ' and such-like raise or depress the fore-wings to hide or expose the ocellus." *

During the past season living *Pyrameis atalanta* and *V. urticae* had been observed in the resting attitude, and it was found that in these also the edges of the wings were slightly out-turned, especially at the prominent angles, but to a far less extent than in *c-album*. The observations were made upon captured specimens at St. Helens, Isle of Wight, and bred *urticae* at Oxford.

* For a discussion of these movements see Trans. Ent. Soc. Lond., 1902, pp. 371–2, 440–1.

Mr. E. E. Green said that during the past summer he had bred *Vanessa antiopa* and had observed that the wing-edges were out-turned, especially at the marginal prominences, in the resting position.

Rare Ecuador Butterflies.—Mr. Arthur Dicksee exhibited *Morpho fruhstorferi*, drawing attention to the wonderful opalescence of fresh specimens, in contradiction of Fruhstorfer's statement that they are chalk white.

Morpho sulkowskyi sirene, ♀, with much stronger and blacker markings than the type form and with the margin of the hind-wings somewhat serrated.

A new race of *Morpho didius*, ? ♂ and ♀, more intense blue than *didius* above and a black brown underneath instead of red brown, with very much stronger markings.

Coenophlebia archidona, ♀, of which, after inquiry, he could only find one other specimen. With it was a normal male from Colombia and a normal male from Ecuador, and also a very dark male. From its appearances it would seem as if this female, which was lighter than any, had come from Colombia. The great distinguishing point of the female is the complete absence of the triangular silver mark on the middle of the costa of the underside of the fore-wing.

Scents of Butterflies.—Dr. F. A. Dixey said that, so far as he was aware, no record existed of the scent of *Synchloe daplidice*, ♂. He had lately had an opportunity of testing it for scent at Lisbon, where it was abundant in August of this year. Of three males examined, one had no perceptible odour, but each of the others had a distinct flowery scent, suggesting that of the sweet-pea. It was noticeable that the scentless male was in fresh condition, while one of the males which gave a distinct scent was rather worn.

Another species not previously examined for scent was *Argynnis lathonia*. A fresh male specimen captured in Madeira emitted a distinct fragrance, like that of the garden flower known as "heliotrope."

The scent of British specimens of *Ganoris rapae* had been compared by Prof. Image to that of sweetbriar, in which comparison both Dr. Longstaff and the present speaker agreed. But according to the experience of the latter in

this country, the scent in *G. rapae*, ♂, was often faint, and not seldom absent altogether. It was therefore worthy of remark that of ten male specimens from Lisbon and Tenerife respectively, not one gave a negative result when examined for scent. All had a strong, distinct odour of sweetbriar, in one case with an added pungency like peppermint. In another one it was observed that the scent was still perceptible some hours after death. Females from Lisbon, Madeira and Tenerife were tested, but in no case was any odour detected in individuals of that sex.

Two Beetles new to Britain.—Mr. Donisthorpe exhibited specimens of *Aulonium ruficorne* Ol., and *Hypophloeus fraxini* Kug., two species of Coleoptera new to the British list, together with their respective hosts *Tomicus laricis* F., and *Tomicus sexdentatus* Boern., taken by Prof. Beare and himself in Scots pine in the Forest of Dean, August 3 and 4, 1922.

Wednesday, October 18th, 1922.

Prof. E. B. Poulton, D.Sc., M.A., F.R.S., etc., Vice-President, in the Chair.

Election of Fellows.

The following were elected Fellows of the Society :—Messrs. S. Stuart Light, Redcot, Linton Road, Hastings; G. H. E. Hopkins, Downing College, Cambridge; V. G. L. van Someren, C.M.Z.S., M.B.O.V., Nairobi, Kenya Colony.

Exhibitions.

Leptura rubra from Norfolk.—Mr. Donisthorpe exhibited a number of specimens (♂♂ and ♀♀) of *Leptura rubra* L., that he had taken at Horsford in Norfolk in August last. He pointed out that this beetle was first taken in Britain by Mr. Thouless, who captured a specimen on the wing at Horsford on August 6, 1918, and each year since he had taken a small number of specimens. This year the exhibitor had observed

it in considerable numbers over a wide area, and he expressed his opinion that it had been present in this district for many years past.

A peculiar organ of the Notodontidae.—Dr. Jordan showed some Notodontidae and said that in a large number of exotic species of this family the males have on the sides of the abdomen a peculiar organ not met with outside the Notodontids. It is particularly frequent in American genera (*Heterocampa*, *Salluca*, *Hapigia*, etc.). In the species in question the upper margin of the sternite of the fourth segment is widened into a lobe of varying size, the lobe bearing a spine or a bunch of spines at the apex or a regular comb of many spines at the posterior margin. The lobe partly covers a deep cavity, in which evidently opens a gland. The organ is present in all the species in which the scaling on the underside of the hind-wing is modified in some way, but is also found in a number of species with normal scaling. The function of the organ seems to be that of a transmitter of scent from the abdomen to the hairy hind-tibia and hind-wing. An illustrated account of the organ will appear in another place.

Seasonal changes in the colours of the female bellargus.—Prof. Poulton said that he had received the following interesting communication from Dr. R. C. L. Perkins, F.R.S. :—

"*September* 27, 1922.—I collected a fine series of ♀ *A. bellargus* (*adonis*) in the exact spot where we obtained them last year, *i. e.* from the same restricted colony (on the Cotswolds) which extends over a few acres of hillside. It was very interesting. Not a single blue ♀ in last year's lot, but many almost like *astrarche* (*agestis*) in colour : this year's females for the most part highly suffused with blue. Owing to the season being later this year, I only had a few hours on two of the last days of our stay, or perhaps I should have taken some like the glorious blue specimens I sent to C. G. Barrett in the excessively wet summer of 1888 or 1889, when the species was only coming out fresh in late September or October."

Dr. E. A. Cockayne had kindly directed his attention to two papers by Dr. G. G. C. Hodgson, who had also observed

the effect of cold wet summers in producing blue females of Lycaenidae :—

" Notes on the effect of Climatic Conditions on Sexual Dimorphism " (Trans. City of London Ent. Soc., 1908, xviii, pp. 23–32).

" Some notes on *A. bellargus* with references to allied species " (*Ibid.*, 1907, xvii, p. 43).

The sudden appearance of the western hind-wing pattern in males of Papilio dardanus Brown, at Kibwezi, Kenya Colony.—Prof. Poulton exhibited the male specimen referred to by Mr. W. Feather in the following letter, dated August 27, 1922. Males from the West Coast (Lagos), W. and E. Uganda, Nairobi, and Mombasa were also shown, together with one possessing the *tibullus* Kirb. pattern, collected by Dr. S. A. Neave at Kibwezi (about 3000 ft.), April 2–4, 1911.

" I am sending you a specimen of *Papilio dardanus tibullus* which has the black band on hind-wing broken through by yellow. Previous to 1922 I have never seen a specimen here with the band thus interrupted. This year during the dry season (from early May to the last week in October—if the season is a normal one) all the specimens I have examined up to the present date have had a most unusual amount of yellow on the outer margin of the hind-wing. Now, the place where *tibullus* occurs is ground that is covered by lava rocks with underground water; consequently, the bush and trees are in leaf all the year. So it is rather hard to see why the dry season should affect this insect. I very seldom see a specimen far from this lava-covered ground."

Prof. Poulton said that it was difficult to believe that the sudden appearance of these males at Kibwezi was due to the dry season. East Africa with the most heavily marked males (*tibullus*) was drier than West Africa with the less black *dardanus*. The pattern of the latter form extended from the West Coast to the high Kikuyu Escarpment in Kenya Colony, where it appeared in the small mountain form *polytrophus* Jord., possessing a male armature similar to that of the East Coast *tibullus*. Transition between this and the *dardanus*

armature was found in Uganda, especially towards its eastern border, although the pattern was always that of the less heavily marked western *dardanus*. At Nairobi, near the Kikuyu Escarpment but at a lower level (about 5500 ft.), the males were larger and their patterns transitional between *polytrophus* and *tibullus*, comparatively few retaining the reduced hind-wing band of the Western form.

Dr. Jordan considered that the structural differences in the male armature were not such as to prevent interbreeding, and it was probable that the whole community from the West to the East Coast was syngamic. In these circumstances a fluctuation in the line of demarcation between adjacent areas with different patterns was by no means improbable and afforded the most likely interpretation of the appearance of males, only differing from those of *polytrophus* by their greater size, at Kibwezi, over a third of the distance between Nairobi and the East Coast. It would be of the highest interest to continue the observations in future seasons and also to determine whether the same change has occurred in localities between Kibwezi and Nairobi and also in those still nearer to the East Coast.

Delayed development a result of the in-breeding of Abraxas grossulariata.—Prof. Poulton said that since the summer of 1917 he had, with the kind help of Miss Balfour, been breeding families which had all sprung from the eggs laid by a female taken in the garden of St. Helens Cottage, St. Helens, Isle of Wight. No fresh blood had been introduced at any time, but apart from this no attempt was made to keep the different strains separate. One of the earliest effects observed was the delaying of development which had reached its climax in a larva of the fifth generation exhibited to the meeting. This caterpillar, the only survivor of its family (although one other family produced several imagines during the past summer), and now about half grown, had been sleeved out upon *Prunus pissardii* on July 21, 1921 ! It was apparently healthy, and had been observed freely feeding on the morning of that day (October 18).

The results were so extraordinary that it might be supposed that a larva hatched in 1922 had been accidentally

included in a sleeve containing those of the previous year. This interpretation was excluded by the fact that the larva had reached by last July a much larger size than that attained even so late as October, by any of those hatched in 1922.

Papers.

The following papers were read :—

" On Schmit-Goebel's Types of Carabidae," by Mr. H. E. Andrewes.

" On the Larva and Pupa of *Sabatinca*," by Dr. R. J. Tillyard.

" On Endomychid Coleoptera," by Mr. G. J. Arrow.

" On the Biology of some British Neuroptera," by Mr. C. L. Withycombe.

" On the Rhopalocera of the 1921 Mt. Everest Expedition," by Mr. N. D. Riley.

Wednesday, November 1st, 1922.

Prof. E. B. Poulton, M.A., F.R.S., etc., Vice-President, in the Chair.

Election of Fellows.

The following were elected Fellows of the Society :— Messrs. A. N. Burns, Salisbury Road, Rose Bay, Sydney, New South Wales; R. T. Daubeney, B.A., Herne Vicarage, Herne, Kent; C. C. Ghosh, B.A., Agricultural College, Mandalay, Burma; L. G. Higgins, M.A., F.R.C.S., Heatherside, Woking, Surrey; J. F. Marshall, M.A., Seacourt, Hayling Island; A. E. Moore, Brookside, Brent Mead Avenue, Golder's Green, N.W.; A. Musgrave, Australian Museum, Sydney, New South Wales; Miss E. K. Pearce, Kempston, Bournemouth West; Messrs. E. Piazza, 4734, 48th St., San Diego, California, U.S.A.; J. Price, 165, Corporation Street, Stafford; the Rev. W. H. Richardson, 2, Wanderers Avenue, Wolverhampton; Messrs. A. H. Ruston, Aylesbury House, Chatteris,

Cambs.; F. E. Wilson, Jacana, Darling Road, East Malvern, Melbourne; and H. E. Winser, 2, Mead Road, Cranleigh, Surrey.

Gift to the Society.

The Treasurer announced that he had received £500 towards the Housing Fund from the Misses Chapman on behalf of their brother, the late Dr. T. A. Chapman, F.R.S.

Exhibitions.

A Note on Belenois gidica Godt.—Dr. F. A. Dixey exhibited specimens and drawings of the genitalia and scent-scales of *Belenois gidica* Godt., with those of some other species of *Belenois* for comparison. He said :—

" The old-world Pierine group to which the well-known forms *B. calypso* Drury, *B. zochalia* Boisd., and *B. mesentina* Cram., belong, may be treated either as a section of *Pieris* (Trimen, Aurivillius) or as a separate genus under the name *Belenois* or *Anaphaeis* (Butler, Fruhstorfer). Though capable of some subdivision, it constitutes in most respects a natural assemblage; but the divergence in some structural points shown by one group of subspecies seems sufficient to raise a doubt whether it is properly included in the same genus or section with the other species just referred to. The group of subspecies in question is that included under the general head of *Belenois gidica* Godt.

" A structural feature common to all the ordinary forms of *Belenois* is the prolongation of the clasper in the male into a long posterior spine directed backwards. There is no posterior spine on the clasper of *gidica*, but only a slight convexity in the corresponding situation. Another point is the structure of the scent-scale. In all the other species of *Belenois* the sides of the lamina are nearly parallel or slightly sinuous, the apex is comparatively sharp, the distal border is furnished with an array of well-developed fimbriae, and the accessory disc is large, rounded, oval or chestnut-shaped. In *gidica* the lamina is slug-shaped, dilated towards the base; there are no fimbriae, their place being taken by a few minute tubercular processes of the blunt distal border. The accessory

disc is almost non-existent, being reduced to a hardly perceptible dilatation of the proximal end of the footstalk.

" These points are all easily visible in the drawings exhibited, which represent the clasper and scent-scale of the male *B. gidica*, compared with the corresponding structures in other species of *Belenois*.

" So far, however, as neuration goes, *gidica* might well be a *Belenois*. It is also worth noticing that its larva, like that of at least one other species of *Belenois*, is stated to feed on *Capparis*."

In the course of the discussion that followed Dr. Dixey's remarks, Commander WALKER said that *Belenois teutonia* feeds on *Capparis*, and Dr. MARSHALL said that *B. mesentina* has the same food-plant in South Africa.

THE TYMPANAL ORGAN OF SPEIREDONIA (NOCTUIDAE).—After having described the special abdominal tympanal organ which characterises the noctuiform families of moths, and drawn attention to the great diversity obtaining in the development of this organ within the families, Dr. JORDAN said that in those Noctuid genera in which the first abdominal pleurum forms a large lobe or dome over a deep tympanal cavity the first stigma is found within the cavity, while in the species of the allied families with a similarly large dome (often resembling a bladder in dorsal aspect) the stigma is placed on the outer surface of the pleurum, visible in a lateral view of the abdomen. In *Speiredonia* and some allied Noctuids a specialisation obtains that is worth recording. As a rule the Noctuids have, in the cavity, a vertical ridge in front of the stigma, the ridge being often a mere line, but sometimes enlarged into a long lobe. In *Speiredonia* the ridge is moderately raised, and its edge is drawn out into a row of hair-like, branched processes which project forward over the inner portion of the tympanal cavity and almost touch the thorax. These false hairs are fairly stiff and end in very thin points. The hedge thus formed may possibly serve as a guard against the penetration of foreign bodies into the deep recesses of the cavity where the delicate tympanal membranes are found; but it appears more likely that the filaments are a means of increasing by their vibration the strength of the sound-waves.

Dr. Eltringham gave some account of similar organs in Geometrids. Mr. Swynnerton said that in the course of some experiments on the food preferences of birds, he had been unable to detect that Noctuid moths have the power of appreciating sound at all in the ordinary sense of the word. The vibrations caused by the fluttering of another individual are, however, detected instantly.

Dr. Eltringham said that he thought that hearing in insects, like scent, is probably selective.

Homoeosis in Coenonympha pamphilus.—Dr. E. A. Cockayne exhibited a ♀ of *C. pamphilus* L., in which a large area on the underside of the right hind-wing has the colour, pattern and scaling of the homologous area of the underside of the right fore-wing. The wing is a little smaller than the other, but the shape and neuration are normal. It is the fifth example recorded in this species, and it was taken by Mr. F. J. Coulson at Walton Heath on July 3, 1922.

An intersex of Mydaea duplicata.—Mr. J. E. Collin exhibited an "intersex" of *Mydaea duplicata* Mg. (Diptera), captured by Prof. J. W. Carr in Sherwood Forest on July 6, 1919, apparently exactly similar to the two specimens described by Schnabl (W.E.Z. 1890, pp. 177–181). This "intersex" was described as a new species by Zetterstedt in 1860 under the name of *Anthomyza flavogrisea*. Prof. Carr's specimen makes the fourth known example. The exhibitor called attention to the work that had been done recently in America by Sturtevant and others in the production of intersexes in breeding experiments with *Drosophila melanogaster* and *D. simulans*.

Living larvae of a Nemopterid from the Egyptian desert.—Prof. Poulton exhibited, on behalf of Mr. E. N. Willmer, three living Nemopterid larvae and an imago taken in the Wadi Digla, near Cairo, in September, 1922. The latter, which might not be the same species as the larvae, was identified by Mr. H. Campion as probably *Klugina aristata* Klug. The larvae, kept with some of the blown desert dust in a glass-topped pill-box, and for exhibition in a glass tube, seemed to be quite healthy after many weeks without food. Quite recently insect food had been offered to them, but it was

uncertain whether they availed themselves of it. It was certain that they are not cannibals, for all were kept in the same small tube and one was much smaller than the others.* The remarkable jerky movements of the long "neck" probably enabled the larva to pick up living food in a wide circle round its body, which was itself invisible against the dust. Mr. Willmer had written the following interesting account of the habits of these insects and the conditions in which they are found :—

"Three larvae found in caves in the steep banks of the 'wadis' or desert valleys. The larvae are to be found walking over the surface of a fine dust which covers all the rock ledges in the caves. They are rendered conspicuous by blowing on the dust and causing them to move.

"The larvae can sometimes be found under shelves of rock in the open, but they only appear to live where there is that fine dust which is so characteristic of the caves. Their food probably consists of other small insects and mites.

"The adult insect flies in the entrances to the caves just before sunset, and with its long hind-wings much resembles the spiders' webs which drape the walls of all the caves. They appear to be most common during August, but a few may be obtained in September. The larvae appeared to be in all stages of growth, but probably all were young.

"It is interesting to note that they appear to be far more common in the desert caves than in the Pyramids, where they were apparently first discovered; in fact, a search in the Pyramids proved entirely unproductive."

Mr. E. E. Green and Dr. Imms gave some account of the habits of a somewhat similar species found in India and Ceylon, and Mr. Blair said that he had received the same or an allied species from Palestine.

* The above sentence was premature. About the middle of November the small larva was sucked dry by one of the others. The empty skin remained in a perfect condition.—E. B. P., November 28th, 1922.

Wednesday, November 15th, 1922.

The Rt. Hon. Lord Rothschild, M.A., F.R.S., etc., President, in the Chair.

The Secretary announced that the Council had nominated the following Officers and Council for 1923 :—

Officers.

President. E. E. Green, F.Z.S.
Treasurer. W. G. Sheldon, F.Z.S.
Secretaries. S. A. Neave, M.A., D.Sc., F.Z.S.
H. Eltringham, M.A., D.Sc., F.Z.S.
Librarian. H. J. Turner.

Council.

Robert Adkin, E. C. Bedwell, J. E. Collin, F.Z.S., J. Davidson, D.Sc., F.L.S., J. J. Joicey, F.L.S., F.Z.S., etc., F. Laing, R. W. Lloyd, W. G. F. Nelson, N. D. Riley, Prof. E. B. Poulton, M.A., D.Sc., F.R.S., etc., Lord Rothschild, M.A., F.R.S., etc., and H. Willoughby-Ellis, F.Z.S.

Election of Fellows.

The following were elected Fellows of the Society :— Messrs. A. E. Butler, The Nook, Cleveden, Somerset; G. W. Holloway, The Hill, Amberley, Glos.; the Rev. J. F. Perry, St. Anne's Priory, Edgehill, Liverpool; G. B. Ryle, Pangbourne, Berks; B. Stewart, Lovell House, Leeds, Yorkshire.

Gifts to the Society.

The Treasurer announced the bequest of £1,000 by the late Mr. Hamilton Druce, the income from which is to be devoted to the Library. He also stated that Mrs. Newman had presented to the Society a portrait of the late Edward Newman, who was President of the Society in 1853–4.

Exhibitions.

A Cecidomyiid new to Britain.—Mr. C. L. Withycombe said :—

" In May of this year I found under the bark of a felled birch tree in Epping Forest large numbers of larvae of a

Cecidomyid. The main interest at the time was in the fact that the larvae grouped themselves in star-shaped clusters of from six to forty individuals (photograph exhibited) with their anterior extremities directed inwards to a point. In this way they were evidently feeding. About one hundred clusters were seen along two feet of the birch trunk, after stripping. A few clusters were secured, and these emerged as flies late in June.

"Mr. F. W. Edwards of the British Museum (Natural History) has very kindly identified the insect for me and reports as follows :—' The Cecidomyid is apparently *Miastor hastatus* Kieffer, which was reared from larvae found under hornbeam bark in Lorraine. This species differs from *M. metroloas* Meinert, as figured by Kahle (Zoologica, Heft 55, 1908), in having larger eyes and a much more curved radial sector. *M. hastatus* is quite possibly identical with the earlier but insufficiently described *M. hospes* Winn.'

"Mr. Edwards informs me that adults of the genus *Miastor* have not previously been recorded as British, although larvae, possibly of this genus, are recorded by Bagnall (Lancs. & Ches. Nat., 1918).

"*Miastor* is, of course, the classical example of paedogenesis in insects, several larvae being produced in the interior of a single parent larva by internal budding. These then escape by rupture of the parent body wall and commence independent existence. It would be interesting to know whether each star-shaped colony is the produce of a single paedogenetic larva."

This exhibit gave rise to a discussion on the phenomenon of paedogenesis in which Messrs. Collin and Blair and Dr. Imms took part.

The shrew-like appearance of a Lasiocampid moth from Java.—Prof. Poulton exhibited a photograph just received from Dr. Th. Mortensen, of the moth *Suana concolor* Wlk., in the attitude of rest. In this position the resemblance, both in size and shape, to a shrew was very striking, but inasmuch as Dr. Mortensen proposed to figure and describe this example himself the discussion of detail was postponed until after the appearance of his paper.

Mimicry in N. Rhodesian Lepidoptera: observations noted on the spot.—Prof. Poulton said that he had recently come across the following passage in a letter written to him on January 28, 1907, by Dr. S. A. Neave from Kansanshi, N.W. Rhodesia:—

"I have taken one specimen of a most remarkable diurnal moth which, especially on the wing, is a very perfect mimic of a large *Teracolus* or *Belenois*. In fact I took it at first for a ♀ *T. regina*. I have also seen two specimens (which I did not have a chance of taking), of an astonishingly good *chrysippus* mimic, which would appear to be some species of *Euryphene* or some allied genus. The resemblance both in coloration and flight is wonderful. It occurs in the thickly wooded type of country which we get here."

Dr. Neave had informed him that the moth was the Saturniid, *Pseudaphelia apollinaris* Boisd., and that its Pierine-like flight differed widely from that of its allies. He also said that the butterfly was the female of *Diestogyna iris* Auriv. This species is referred to in the following passage from Dr. Neave's paper in Proc. Zool. Soc. Lond., 1910, p. 38:—

"Very common throughout Katanga and the northern portion of N.E. Rhodesia, west of the Mchinga escarpment. . . . It would seem to be a true Batesian mimic of *Limnas chrysippus*. It usually settles on the ground, and when doing so, temporarily sits with expanded wings showing its *chrysippus*-like coloration. When going to rest, however, it settles with closed wings among dry leaves, and then, owing to its cryptic underside, is extremely inconspicuous."

In view of the natural and proper desire for complete evidence that model and mimic fly together and resemble each other in life, it was right that these observations, noted on the spot when the insects were seen for the first time and would attract the keenest attention, should be recorded in a permanent form.

Notes on insects visiting the common primrose.—Prof. Poulton said that Mr. W. H. T. Tams' interesting paper in "The Journal of Botany" (Vol. 60, July 1922, p. 203) had reminded him of some observations made in the spring of

1893 by his dear friend Prof. Raphael Meldola and himself, in the neighbourhood of Peasenhall, Suffolk. The insects observed are well known to visit the primrose: a list of records with full references will be found in Mr. Miller Christy's paper in Journ. Linn. Soc. Bot., xlvi (1922), pp. 105–39. There is, however, so much doubt about the adequacy of these visits to effect sufficient cross-fertilisation that it seems worth while to add a few further observations which were noted down at the time.

"*April* 8, 1893.—Meldola and I saw a Humble-bee-fly (*Bombylius*) * visiting the primrose on the edge of Coo Wood, near Peasenhall. It visited the flowers one after the other most systematically, plunging its tongue in up to the very base. We watched it closely and carefully. It went from one flower to the other on each plant it visited, and then on to the next plant, etc. We saw it suck quite a dozen flowers, and it *only* sought the primrose.

"*April* 15, 1893.—With Meldola saw another *Bombylius* visiting the blue flowers of 'ground-ivy,' *Nepeta glechoma* Benth. (*Glechoma hederacea* L.). It went to two or three successively and then disappeared. Near Heaveningham: roadside bank.

"Saw also on the same day on a roadside bank, near Lodge Wood entrance, a female *G. rhamni* L., visiting once or twice the flowers of primrose, and the male of *P. napi* L., also visiting them once or twice.

"The *rhamni* was persistently chased by a Pierid (almost certainly a male *P. napi*) for a long time (probably a minute). Then they separated, but twice or three times afterwards when the same two butterflies happened to meet they flew round each other for a second or two only and then separated. It seemed in fact that they recognised each other."

Prof. Poulton said that he had also often seen *Bombylius* visiting the primroses in his garden at St. Helens, Isle of Wight.

Mr. A. H. Hamm had written the following account of his experiences.

* Almost certainly *B. discolor* Mik., possibly *B. major* L.

" For many years past I have frequently observed *Bombylius discolor* and *major* hovering over the flowers of the primrose in the woods near Oxford. Though the latter species is the commoner of the two, the former is more frequently seen visiting this plant. In the University Parks in the spring, *B. major* is often seen, with an occasional *B. discolor*, hovering over the polyanthus blooms. The only definite date I have for *B. discolor* at primrose is April 14, 1906, when I took about a dozen nearly all at the flowers of the primrose in Tubney Wood, near Oxford. I have often seen other small Diptera in the corolla, but have kept no record of the species or group.

" Other insects often seen when the flowers are picked or shaken are *Meligethes* and another small beetle, and sometimes a species of thrips."

Mr. Collins' experience is as follows :—

" I have often seen *Bombylius discolor* Mik., visiting primroses in spring and have noticed that they are fond of resting on dry oak-leaves on the ground when not at the flowers. I have often seen it on Boar's Hill, Tubney, Cothill and other places near Oxford, but always in woods where primroses were plentiful and in flower.

" I have also found the Staphylinid beetle *Eusphalerum primulae* Steph., abundant in primrose flowers, near Oxford. They occur as late as June at Tubney, Wytham and Stowe Wood. The Nitidulid beetle *Meligethes picipes* Sturm., is also plentiful in primrose flowers in spring. I have seen them covered with yellow pollen coming out of the corolla of the flower when it was picked."

Mr. Hamm and Mr. Collins agreed with him in the belief that *Bombylius*, although a visitor to other flowers, sought the primrose far more commonly than any other.

Mr. Miller Christy, in the paper quoted on p. lxxxv, considers the visits of these insects and certain others are insufficient to account for cross-fertilisation, and believes that moths are the probable main agents. It is, however, of importance to inquire how far the primrose is crossed legitimately. The late Prof. Weldon, F.R.S., had told him that when he was teaching at Cooper's Hill and wanted to

show the different forms of flowers to his class he began to collect in the neighbourhood, but could only find primroses of one form.

Is it not probable that fertilisation was often effected locally and illegitimately by means of small beetles, thrips, etc., with limited powers of ranging, and that sufficient legitimate crossing to maintain the strength of the stock is carried on by *Bombylius* and the Lepidoptera with tongues of sufficient length which have been observed to visit the flowers?

In the discussion Mr. A. E. Tonge recorded the fact that he had netted *Cucullia verbasci* L., at primrose bloom when collecting at dusk in April near Chichester.

Aberrations in Papilios from Formosa.—Mr. Arthur Dicksee exhibited :—

(1) An example of homoeosis in *Papilio horishanus*, male, from Central Formosa. On the underside of the left fore-wing is an oblong patch, 5 mm. × 2·5 mm., of the colour and with the rough scales of the underside of the hind-wing. It lies along the middle of nervure 4, and projects forwards half-way across cell 4. It is bright red with a semicircle of black, which is broad internally and anteriorly and becomes very narrow where it touches the nervure on either side. The black part represents the posterior part of the black spot in the middle of cell 4 of the hind-wing, but is not identical in shape with it : in the hind-wing the black does not touch the nervure and is slightly convex posteriorly. The abnormal wing is fully developed, shows no reduction in size, and has a normal upper side and neuration. Similar examples have been described in *Papilio bianor* (Proc. South Lond. Ent. and N.H. Soc., 1888, pp. 39–40), and *P. glaucolaus* (Berl. Ent. Zeitschr., 1908, liii, pp. 199–201).

(2) An aberration of the male of *P. thaiwanus* from Formosa, together with a normal male and female. Instead of the hind-wing being rounded it is of the somewhat square shape of the female, but even more pronounced, and it shows a greater development of a tail.

(3) Twelve specimens of the females of *Agrias amydon* and *A. muzoensis* from Colombia, correcting the statement of Fruhstorfer in Seitz that the female never has any blue mark

on the hind-wing. In the three examples the blue mark is very pronounced; in one it is distinct; in five others it can be seen with the naked eye; in two a magnifying glass is required to detect the blue scales; and only one specimen is without them. Fruhstorfer is also incorrect in stating that the female from Brazil is the only one that has red marks on the hind-wing. In one example there is a very pronounced red mark in the cell, and it can be distinguished in five others.

Papers.

The following papers were read :—

" A revision of the Australian species of the Genus *Melobasis*, Fam. Buprestidae, Order Coleoptera, with notes on allied genera," by Mr. H. J. Carter, B.A.

" Description of the pupal shell of *Lachnocnema bibulus*," by Mr. G. T. Bethune-Baker.

Wednesday, December 6th, 1922.

The Rt. Hon. Lord Rothschild, F.R.S., etc., President, in the Chair.

Obituary.

The President announced the death of Mr. H. J. Elwes, F.R.S., a former President, and a vote of condolence with his relatives was passed.

Nominations for 1923.

The Secretary again read the list of nominations of Officers and Council for the ensuing year, and said that he had not received any alternative names.

Election of Fellows.

The following were elected Fellows of the Society :—Mr. Donald Allen, 21, All Saints Road, King's Heath, Birmingham; Mr. H. L. Andrewes, c/o John Heelas, Esq., Queen Anne's Mansions, London, S.W.

Gifts to the Society.

The Treasurer called attention to two new portraits in the Meeting Room, and also exhibited the plans for the new Meeting Room which it was proposed to erect at the back of the present building at some future date. These had been drawn up by Mr. W. Rait-Smith and presented to the Society. A vote of thanks to him for his generosity in the matter was passed unanimously.

Exhibitions.

A Dipteron associated with Ants.—Mr. Donisthorpe exhibited a larva and pupa cases of a species of *Microdon* (either *M. latifrons* Lw., or near to it) which he had found in the galleries of *Acanthomyops* (*Donisthorpea*) *niger* L., in stumps of Scots pine in the New Forest on May 6 and 11, 1922; also a pupa case of true *Microdon latifrons* from Woking, larvae and pupa case of *M. mutabilis* from Porlock, and an imago of *M. devius* from near Oxford. He mentioned the British distribution of *M. latifrons*, and also said that Father Wasmann had told him that the pupa cases he had sent to the latter from the New Forest were *M. rhenanus* Andries, a species new to Britain.

A rare British Tortrix.—Mr. W. G. Sheldon exhibited three specimens of a rare British Tortrix, *Hedya simplana* F. von R., from Kent. These were the only examples taken or seen by him in a fortnight spent in the locality.

Homoeosis in Butterflies.—Dr. E. A. Cockayne exhibited :—

(1) Two examples of homoeosis in *Coenonympha pamphilus* L., taken by Mr. H. A. Leeds in 1922. The first, a male from Kent, has a number of patches of the tawny colour of the underside of the fore-wing on the underside of the right hind-wing. These patches have scales like those of the fore-wing, and are devoid of hairs. The second, a male from Monk's Wood, Hunts, has areas with the colour, and with the scales and hairs of the underside of the hind-wing on the underside of the right fore-wing. Both have the upperside and neuration normal, and show no sign of injury.

(2) Homoeosis in *Lygris* (*Cidaria*) *prunata* L. This is a male taken at Malvern in 1904 by the Rev. A. Day. On the upperside of the right fore-wing there is a narrow whitish stripe with scales of the same structure and colour of those of the anterior part of the upperside of the hind-wing. It runs through the outer part of the dark basal area, and right across the dark central area of the wing lying in the anterior part of the discoidal cell and along both sides of nervure 6. The underside and neuration are normal, and there is no sign of injury.

(3) *Zygaena trifolii*, male, with symmetrical absence of scales in the interneural spaces of both fore-wings, which gives it a radiated appearance. The red scales of the outer two spots on the fore-wings are deficient in pigment and curled up.

Limenitis sibilla L., from the New Forest.—Capt. K. J. Hayward exhibited an example of *Limenitis sibilla* L., taken by himself in the New Forest, July 11, 1922, having four symmetrical scaleless patches—one on each wing above, at the interior and anal angles respectively.

Structure of the tympanic organ in Noctuid Moths.—Dr. H. Eltringham recalled the exhibit by Dr. K. Jordan at a previous meeting of some preparations showing part of the structure of the tympanic organ in Noctuid moths. In these moths the organ was situated in the thorax, but in the Geometers and some other families it was in the abdomen. As the structure was of considerable complication, and difficult to describe at all briefly, he had made a wax model of it, which, though rather roughly constructed, would probably serve to illustrate the structure fairly distinctly to those who cared to examine it. He had not written anything about it at present, as he was hoping to receive from Madagascar some large Uranid moths from which he expected to obtain fuller information in regard to the nerve structure and distribution. Meanwhile he would urge Fellows, when the opportunity occurred, to make a note of any observations that might indicate a sense of hearing in moths.

Dr. Jordan called attention to the great importance from a systematic point of view of Dr Eltringham's investigation.

The scent-organ of certain mimetic Castniidae.—Dr. K. Jordan exhibited some species of Castniidae which resemble butterflies, and said that these mimetic Castniids fall into two groups, each characterised by certain details in the neuration and the colouring of both sexes, and by very conspicuous differences in the development of secondary sexual organs in the ♂♂. In the one group (*C. linus*, *C. zagraea*, *C. carilla*, etc.) the paronychium of the midtarsus of the ♂ is enormously enlarged, and there is no abdominal scent-organ. In the other group (*C. melessus*, *C. amazonica*, *C. cycna*, etc.) the first two abdominal sterna of the ♂ have a large scent-organ on each side, which he described in detail. The organ produces a substance which (in the dry specimens) looks like grey or blackish mud and forms a thick coating nearly over the whole ventral and ventrolateral surfaces of the abdomen. The scaling on the innerside of the hindtibia and hindtarsus of these ♂♂ has developed into a pale brush. The paronychium of the midtarsus is not enlarged.

Sexual Dimorphism and Mimicry in Geometrids of the Genus Bordeta Walk.—Mr. Louis B. Prout, on behalf of Mr. J. J. Joicey, exhibited species of the *Bordeta lemnia* group, together with their supposed ♀♀, and specimens of *Eucharidema* for comparison, and read the following notes :—

Recent careful examination has convinced me that there is extraordinary sexual dimorphism in the group of "*Bordeta*," of which *lemnia* Bdv. ("Voy. Astrolabe, Fn. Ent. Pacif." i, 207, t. 5, f. 7, 1832) is the longest-known species. This form, not very rare on Amboina, and recently collected (two ♂♂) by the Pratt brothers in Central Ceram at about 3000 ft. altitude, is invariably ♂. A very different-looking insect from the same localities and always ♀, "*Craspedosis* (?)" *bicolorata* Warr. (Nov. Zool. iii, 398), was collected by the Pratts in three examples. The more blurred white markings (as compared with the allies) is a feature common to the two, while "*bicolorata*" retains an orange, black-belted posterior half of the abdomen beneath as a further indication of its ancestry, and close investigation reveals other points of contact with *lemnia*.

B. posticigutta Prout (Bull. Hill Mus. i, (2), 291), from higher

altitudes in Central Ceram (4600–6000 ft.) is evidently a nearly related species to *lemnia*, and is again invariably ♂; the insect, taken at the same altitudes, which (*loc. cit.* 292) I thought must "surely belong" to *Eucharidema apora* Prout, "in spite of remarkable differences in venation," bears so closely the same relation to *posticigutta* as does *bicolorata* to *lemnia* that I have now no hesitation whatever in associating the two pairs, the more so as an aberrant ♀ of *posticigutta*, which I am exhibiting, retains a vestige of the white cell-spot on the fore-wing above and beneath, and some slight suffusion of orange scales on hind-wing beneath.

Further confirmation is just to hand in the arrival of a good series of a new race of *posticigutta* collected by the Pratts on Buru, both sexes differing from the name-type in quite similar directions—reduction or suppression of the white, yellow or orange markings.

Finally, *B. anisochrysa* Prout (Ann. Mag. Nat. Hist. (8), xx, 127, pl. 7, f. 7, Biak, the type unique) shows on the upper-side some general resemblance to the other ♀♀ of the group, while the hind-wing beneath conserves quite the typical colour-scheme of the *B. tricolor* (Warr.) group, being orange with irregular black band and black border.

How, then, did the remarkable sexual dimorphism arise? I do not think it can be doubted that the occurrence of *posticigutta* together with *Eucharidema apora*—which deceived me into taking them for sexes of a single species—furnishes at least a part of the explanation.

In the type of *Eucharidema trichroa* Rothsch. and Jord. (Deutsch. Ent. Zeit. 1907, p. 197, British New Guinea) the sexes are quite alike. Of *apora*, a race or close ally with greatly reduced red area on hind-wing, the Pratts unfortunately took ♂♂ only (11 in all). The very wide divergence of the ♀♀ above considered from the normal *Bordeta* pattern (which is retained by the ♂♂, as also on the underside of ♀ *anisochrysa*) and their schematic resemblance to *Eucharidema* points to a very fine case of mimicry between diurnal Geometridae, though the nucleus of the mimetic association may have to be sought in some commoner species outside this family. Of *posticigutta* 18 ♂♂ and 18 ♀♀ have been taken.

Appendix: Description of a New Race of *Bordeta posticigutta* Prout.

B. posticigutta decocta, subsp. nov.

♂, 46–48 mm. Abdomen dorsally black or at least (perhaps in one-third of the examples) with the black belts considerably broadened. *Fore-wing* almost as variable as in *p. posticigutta*, but with the spots—especially the proximal and the subtornal—on an average reduced, the minute one on SM^2 only present in one example. *Hind-wing* with the black border somewhat narrowed, entirely without the subtornal yellow spot. Underside the same, but the hind-wing showing, in the broadest-bordered aberration, a minute yellow dot close to termen just behind M^2.

♀, 48–53 mm. *Fore-wing* with the band yellowish-buff in all the known examples (sometimes almost orange, at least beneath), on an average narrower than in the other race, the fork to hind margin always obsolete or greatly reduced and broken—often indicated by a small dot on SM^2, similar to that of the ♂-ab. mentioned above. *Hind-wing* with the orange subtornal band generally reduced, though variable.

Buru: Gamoe 'Mrapat, Central West Buru, 5000 ft., April–May 1922 (C., F. and J. Pratt), a good series in coll. Joicey. Also several from Kako Tagalago, Central Buru, 2700 ft., May 1922.

In connection with this exhibit Mr. Talbot made the following remarks:—

Certain forms of Agaristidae may serve as models or constitute the centre of an orange-and-white association. In Dutch New Guinea the *Eucharidema trichroa* has somewhat similar markings to a form of the commoner Agaristid, *Immetalia saturata longipalpis* Kirsch. In Ceram the *Eucharidema* follows *Immetalia saturata* Walk., form *leucomelas* Jord., which, however, is less common than *Ophthalmis privata* Walk., a species in which the white band is more distal. In Buru the *Bordeta* has a pale orange band and may be associated with *Immetalia saturata* Walk., in which the ♀ has a pale orange band.

Eucharidema, with its sharply defined bands, is perhaps the older mimic of the Agaristid and the *Bordeta* ♀, with its dyslegnic bands, a more recent development in association with the *Eucharidema*. The two allied Geometrid genera

have most likely similar habits, and resemblances would more easily be developed between them than between either of them and an Agaristid. The production of a dimorphic ♀ in the *Bordeta* seems to indicate long and close association with the form (*Eucharidema*) which we see resembles it. If the mimetic interpretation is in any way correct, we can prophesy that an *Eucharidema* with an orange band on the fore-wing will be discovered in Buru.

Rare British Lepidoptera.—Mr. J. H. Durrant exhibited :—

Eucosma (*Crocidosema*) *plebeiana* Z., (Tortricidae), Street, S. Devon, 10. x. 1900 (*E. R. Bankes*)—New to Britain.

Cataplectica farreni Wlsm., Ashton Wold, Oundle, Northants, 11. vii. 1922 (*Hon. N. C. Rothschild*)—a new locality—hitherto only taken at Cambridge and King's Lynn.

Hipocrita jacobaeae L., var., Woodchester, E. Gloster, 15. v. 1920 (*L. Lacey*)—a curious pale, slate-grey specimen.

Plusia pulchrina Hw., ab., Rodborough, Gloster, 1. vii. 1919 (*L. Lacey*)—with a large triangular space on both fore-wings devoid of scales.

Sterrha dimidiata Hfn., var., Rodborough, Gloster, 20. viii. 1922 (*L. Lacey*).

Further Examples of Heodes phlaeas ethiopica from S.W. Uganda.—Dr. Eltringham showed eleven specimens, all males, of this geographical race of *H. phlaeas* L., recently sent to Prof. Poulton by Dr. G. D. H. Carpenter. All had been taken at 6000–7000 ft., in Rukiga County, Kigezi District, in the extreme S.W. corner of Uganda, on the floor or along the E. border of the Western Rift Valley. Dr. Carpenter had visited this area in 1916, and his description of it was published in Proc. Ent. Soc. for that year, pp. cxv–cxxii. The exhibited specimens were taken as follows :—

August 22, 1922.—Near Kabale, about 6000 ft.—2.

August 30, 1922.—Lake Bunyoni, about 6600 ft.—1.

September 7, 1922.—Chahafi : a marsh on the E. side of the floor of the Western Rift Valley, about 6500 ft.—1.

September 8, 1922.—At the foot of the E. escarpment of the Rift Valley, near Chahafi : " very localised in one patch "—7.

All the specimens resembled those previously taken by Dr.

Carpenter and Mr. T. A. Barns, the black spot at the anal angle of the fore-wing being concave towards the base of the wing; the blue spots distinct on the hind-wing except in one much-worn example; the inner border of the red marginal band of the hind-wing scalloped. The left fore-wing was pale in one of the seven specimens taken on September 8, an appearance well known in *phlaeas phlaeas* L., of the Northern Belt, and, whether due to inherent variation or to a response to external conditions, emphasising the close affinity between these two geographical races.

Delayed development in an inbred larva of Abraxas grossulariata.—Dr. Eltringham communicated for Prof. Poulton the information that the larva exhibited on October 18, 1922, was alive on November 18, but dead a week later. Prof. Poulton wished to correct an unfortunate error in his previous account. This caterpillar did not belong to the Isle of Wight stock, but was descended, inbred, from a wild pair taken *in coitu* at Oxford in 1920 by Mr. A. H. Hamm.

E. African Lycaenidae showing the attacks of lizards. —Dr. Eltringham showed the specimens figured by Dr. V. G. L. van Someren in his paper in Journ. E. Afr. and Uganda Nat. Hist. Soc., No. 17, Mar. 1922, p. 18, and referred to by Prof. Poulton in Proc. Ent. Soc., 1922, pp. xlix–li, and said that the material exhibited can be studied by naturalists in the Hope Department, Oxford University Museum.

Dr. van Someren made some remarks on the significance of the above specimens, captured by him.

Butterflies from Venezuela.—Mr. W. J. Kaye exhibited a large number of specimens representing the members of the principal Müllerian (Ithomiine, Heliconine, Nymphaline) group from the San Esteban Valley near Puerto Cabello, N.W. Venezuela. The whole of the specimens had been taken by the exhibitor between December 19 and 27, 1920. " The path along which they were found flying or settled runs alongside a broad rocky stream. The San Esteban Valley varies greatly in width, but on either side the slopes rise to about 2000 ft. They are wooded to their summits, but there is some cultivation with clearances near to the village of San Esteban, but as one goes further up the valley cultivation disappears. Practi-

cally all the specimens shown were taken along a two-mile stretch of path, and about half of them in one particular favourite haunt. Practically all were caught flying, there being little or no plants in flower except for a plant or two of *Eupatorium odoratum* (Christmas Bush) near some habitations. These plants were evidently past their full attractiveness, as the only butterflies on them were two ♂ *Perrhybris malenka*." The species represented were :—

DANAIDAE.

LYCOREINAE.

(1) *Lycorea ceres atergatis.*

ITHOMIINAE.

(10) *Hirsutis furia.*
(20) *Mechanitis polymnia doryssus.*
(16) *Ceratinia fraterna.*
(7) *Ceratinia euclea.*
(6) *Ithomia iphianassa.*
(15) *Epithomia alpho.*
(2) *Hypoleria ocalea.*
(1) *Athesis clearista.*

HELICONIDAE.

(14) *Heliconius aulicus.*
(1) *Heliconius anderida estebana.*
(3) *Eueides vibilia.*
(2) *Eueides isabella hubneri.*

NYMPHALIDAE.

(1) *Eresia eunice.*
(5) *Eresia carme.*
(4) *Protogonius hippona lilops.*

PIERIDAE.

(9) *Dismorphia amphione astynomides.*
(1) ♀ *Dismorphia theucharila.*
(2) ♂ *Mylothris malenka.*

HYPSIDAE.

(3) *Pericopis angulosa.*
(1) *Pericopis philithomia*, sp. n.

" The numbers in brackets are the numbers actually caught. In some cases many more specimens might have been taken. *Mechanitis polymnia doryssus*, *Epithomia alpho*, *Ceratinia euclea* and *C. fraterna* were all common, and it is significant that all these are of the unpalatable subfamily Ithomiinae.

" Most curiously only one specimen of *Lycorea ceres atergatis* was seen or taken. No doubt *H. anderida estebana* would accompany the *Lycorea*, as in appearance these two would be the closest in pattern and colouring, while the *Protogonius* would certainly be the next closest. The *Lycorea* and *Protogonius* fly in much the same way, and when fluttering near

a flowering bush, as I found at Caracas, are very difficult to determine at a short distance away. In flight the tails of the *Protogonius* are only noticeable when it is sailing along with outstretched wings above one's head. When fluttering near the ground the resemblance to *Lycorea* is remarkable.

" It is difficult to know where to say the group as a whole ends and what species to include. Objection might be taken to including *Hypoleria ocalea*, but it can easily be mistaken for *Epithomia alpho* on the wing. While in the other direction it links up the more transparent smaller Ithomiine species such as *Pteronymia agalla*, of which four were taken, *Heterosais giulia*, one only of which was taken, and *Episcada sylpha*, which as usual was quite common. These three last species are really properly speaking mountain butterflies, occurring much more commonly at 3000 ft. At 500 ft., the elevation at which the specimens exhibited were caught, many really mountain species occasionally put in an appearance. It is possible, for instance, to take *Olyras crathis* where I was collecting, as I saw a pinned specimen in the hut of an old man who years ago collected for Staudinger. Most probably also *Eutresis hypereia* can also be taken occasionally.

" The total absence of any *Melinaea* was noteworthy as it left *Heliconius aulicus* without any very close mimetic connection. *Melinaea lilis* is found at Caracas at 3000 ft., and it was specially noted at San Esteban that there were no *Melinaea* species to be obtained. *Heliconius aulicus* never flew before 11 a.m., and only if there was strong sunshine. Its flight was usually in long sweeps, and occasionally it would ascend quite fifty feet in height. The actual numbers taken must be looked upon as rather out of proportion to all the other species of the group, as a special effort was made to secure a series of this exceedingly local and usually rare insect. A second *Heliconius* species that occurs on the same ground and which also belongs to the large association is *Heliconius anderida estebana*. The species was apparently only just beginning to appear, as two fine specimens were seen but not taken. A very old and worn specimen was, however, secured, making the identification certain. The race *estebana* varies to the race *clara*, and a most varied series was obtained by

Mr. Klages a number of years ago, a series of which is here shown. No doubt *H. a. estebana* greatly resembles *Protogonius hippona lilops* on the wing, as I noted in Trinidad that the *Heliconius* there, *H. numata ethilla*, flew with and greatly resembled while in flight *Protogonius hippona ochraceus*. While watching these flights a most interesting fact was noted. The *Protogonius* was observed, while sailing along overhead, to present the upperside colouring. Earlier in Venezuela I noted the same phenomenon with *lilops* at San Esteban, and have since proved that how this happens is that the cryptic colouring of the underside is composed of partly transparent scaling which is also set more openly instead of very closely as on the upperside. The result is that the colouring of the upperside against the light shows through, and thus on the wing the Ithomiine appearance is complete when viewed from above or beneath.

"The story of how I discovered that *Protogonius* was transparent is as follows. In November 1920 I was in Trinidad, and while collecting on one of the hillsides above St. Ann's Valley, I saw *Protogonius ochraceus* below me sailing about with outstretched wings. The inference was then made that if one was below instead of above one would see the dead leaf-like underside. In December I visited Venezuela and in the San Esteban Valley I noted that *Protogonius lilops* flying along in front of me exhibited the upper side. Several specimens of this species were subsequently caught but always fluttering near the ground and no more was thought of the incident. In late December a return was made to Trinidad and on January 1st, 1921, when walking along the Ariapita Road in St. Ann's Valley a number of *Protogonius ochraceus* were observed from below while floating around a tall bush of from 12–15 ft. These specimens very clearly showed the upperside colouring, and the thought came that these butterflies were flying upside-down. At the end of the month I left for England and forgot the incident of the upside-down *Protogonius* until just recently, when I was arranging the mimetic groups for exhibition, the recollection of the *Protogonius* again came to mind. I then held specimens over my head to try and understand how it was I saw the uppersides

from below. The problem was solved immediately as it was at once plain that the upperside colouring showed through the underside.

"Of the other two Nymphalines *Eresia eunice* and *Eresia carme*, the former, flying with *Ithomia iphianassa* and *Ceratinia euclea*, was entirely unsuspected of its identity till in the net; while *E. carme* ♀ was suspected of being a *Eueides vibilia* ♀. It is curious there is nearly always an *Eresia* or two present in these mimetic associations, but they are usually very imperfectly protected as the resemblance is more often only of a general nature.

"The Pierines protected in the association consisted of two *Dismorphia* and a *Perrhybris*. The mimicry of the ♀ *Dismorphia amphione astynomides* to *Mechanitis polymnia doryssus* was of the closest. Of nine specimens of the *Dismorphia* taken, only one was a male while eight were females. The male is not nearly so good a mimic as the female, as besides a slightly different colour its shape does not harmonise with the narrow-winged *Mechanitis*. In every case *D. astynomides* was taken amongst *Mechanitis*. I well remember a bank where *Mechanitis doryssus* was flying and where nothing else was detected but four female *Dismorphia astynomides* flying amongst them. The single *Dismorphia theucharila* ♀ was noticed at once as being something fresh. It was flying slowly alone, but close to where *Ceratinia euclea* had been observed and taken. *Perrhybris malenka* was only secured in the male sex. Two females were also seen, but as has been observed by Bates and others their fondness for the underwood prevented captures being made. Both sexes, however, come freely out in the open to Christmas Bush (*Eupatorium odoratum*) as I found in Trinidad, but the attractiveness of the plant at Esteban was passing. Both the males were taken off this plant, however. Off another *Eupatorium* bush some distance away three *Pericopis angulosa* were observed and taken at different times. These Hypsid moths were all sitting with wings erect over the back in true butterfly fashion. The general resemblance to a *Heliconius* species when in this position is striking. No other species of any kind was ever seen sitting with these *P. angulosa*. Half a mile away a second species of *Pericopis*

(which turns out to be new and is described below) was observed. It was at rest on the upperside of a leaf with wings flat and partly drawn back. It was beaten into the net, and was sluggish as the weather was dull. No other specimen was seen, and neither *P. angulosa* nor the present species was seen on the wing.

" The whole set of insects taken during the week is especially interesting from its rather unusual composition, *Heliconius aulicus* being present in some numbers, and having no very real support from any very similar Ithomiine. *Hirsutis furia* certainly never gave a suggestion that it might be a *Heliconius aulicus*. Probably at different periods of the year the composition of the group varies greatly, as I found it did over a long series of collections made in central British Guiana. But the Ithomiine models of the Heliconines were there never absent. In the case of *Heliconius anderida estebana*, which was practically absent at San Esteban, it was interesting that *Lycorea ceres atergatis* was also practically absent contemporaneously, as these two are probably in close association with the *Protogonius*. The most perfectly protected mimic was undoubtedly the Pierine, *Dismorphia a. astynomides*, as its associated Ithomiine models outnumbered it by at least ten and perhaps twenty times, while the detailed resemblance to two of the models, *Ceratinia fraterna* and *Mechanitis p. doryssus*, made detection on the wing only possible with close scrutiny.

" It remains to be said that lizards were observed in the greatest abundance, especially on the bank before mentioned, where the Ithomiines were mixed up with *Dismorphia a. astynomides*."

Pericopis philithomia, n. sp.

Intermediate between *Pericopis isse* and *Pericopis ithomia*. Fore-wing very dark greyish brown with a slightly paler longitudinal shade below the median nervure. A pale yellow transverse median band from costa to tornus, and a parallel broad pale yellow subapical band. A marginal series of whitish spots from apex to tornus. Hind-wing pale reddish orange, with the discocellulars heavily marked. A broad marginal band composed of oblong black spots or wedge-shaped marks. Just before the margin the ground-colour of the wing shows

through the intervening spaces. Fore-wing below as above except that the basal area is orange, a patch of the same colour entering the cell. Inner margin greyish black. Hind-wing below as above except that the marginal interspaces are whitish and not orange. Exp. 65 mm.

Hab. Venezuela: San Esteban Valley, 23.xii.20 (*W. J. Kaye*).

The Food Preferences of Vespa vulgaris.—Mr. W. J. Lucas said :—

"On November 13, 1922, my attention was taken by a large number of flies sunning themselves on an oak fence facing south along the boundary of Esher Common in Surrey. Most were large—blow-flies or their like—but some were smaller. While watching I noticed a wasp hunting on the wing over the surface of the fence, evidently in pursuit of the flies, which it often approached (though it sometimes made for the nails in mistake !). At length the wasp pounced on one of the smaller flies—a metallic blue-green one—and went down to the ground with it, where I sought and found it at once. It had, however, released the fly and caught a small spider, having made a very rapid change. Both victims were paralysed, but the fly was not quite dead though the spider appeared to be so. The three specimens were given to Prof. Poulton for the Predaceous Insect Series he is forming in Oxford. He considers this to be a very pretty case of preference in the matter of prey. Such things are rarely met with, although they must always be occurring in Nature. A. H. Hamm identifies the wasp as a worker of *Vespa vulgaris* L. and the fly as a male of *Euphoria cornicina* F.; Dr. A. Randell Jackson says the spider is a ♀ of *Meta segmentata* Clerck, an orb-weaver, probably not quite mature."

Varieties of British Lepidoptera.—Mr. L. W. Newman exhibited a long and very varied series of *Lycaena thetis* both upper and undersides including fine striated and *obsoleta* forms and colour variations in the male, all taken at Folkestone September and October 1922. Also for comparison a series of 1921 specimens, the undersides of which instead of being the usual steel-grey have all a distinct reddish colour, which clearly points to the fact that weather conditions have a considerable effect upon the undersides of this species. Also long and varied

series of *Melitaea athalia* from Kent, being picked specimens to show range of variation from extremely light to dark forms; a series of *Melitaea aurinia* from English, Irish and Welsh localities; and a series of bred *Zylina semibrunnea*, from Oundle, Northants.

New and little-known Butterflies from the Island of Buru.—Mr. G. Talbot, on behalf of Mr. J. J. Joicey, said that the brothers Pratt had collected on Buru for Mr. Joicey from January to May 1922, and had succeeded in making a very fine collection of Lepidoptera. Collections were made on the south coast at Lek Soela and in the mountains in the south-west district at elevations of from 2700–6000 ft.

The principal discovery was a new *Troides*, which has been described in the "Bulletin of The Hill Museum," vol. 1, pt. 2, under the name of *T. prattorum* J. & T. Its habitat was found to be very limited in extent, and perhaps for this reason the species remained undiscovered by Dutch collectors who have been all over the Island.

A remarkable aberration of the ♂ of *prattorum* was obtained at the coast between February and March, but there is some doubt as to this locality. This specimen presents some of the characters of *T. helena bouruensis* Wall., with a preponderance of the characters of *T. prattorum*. The fore-wing is shaped like *prattorum*, but with faint vein stripes. The hind-wing is more like *bouruensis*, especially in the form of the cell and in general markings; there is, however, a distinct but slight opalescence on both sides. Whether we have to do with an aberration showing reversion to a primitive type or with a hybrid, is a question we cannot answer. Aberrations are more numerous than hybrids, and it may be more reasonable to suppose that this specimen represents some ancestral type.

Troides helena bouruensis Wall.—Three pairs are exhibited to show the variation in both sexes.

Papilio ulysses ampelius Roths.—The most westerly race of this species, hitherto only known by one ♂. The ♂ and ♀ are shown. Found at the coast and in Central Buru.

Dichorrhagia ninus, subsp. nov.—This form is shown in comparison with typical *ninus* Feld., from Ceram. Obtained up to 2700 ft.

D. ninus Feld.—From Ceram, with the hitherto unknown pupa. This pupa shows the Apaturid affinity of the genus, but is remarkable for the possession of three lobes on the back of the thoracic area.

Charaxes madensis Roths.—A few specimens of this species were obtained, including the unknown ♂. This species, on account of the ♀ markings presenting a resemblance to the ♀ of *C. mars*, has been associated with that species. Now that the ♂ is known, it is seen that the relationship to *mars* is only a remote one, and this species must still be said to be confined to Celebes. We believe that *madensis* is more nearly related to *C. euryalus* Cram., from Ceram, an opinion formed by a close comparison of the markings and from the general prevalence of Ceram forms in Buru. This is the only *Charaxes* in which, the sexes being dimorphic, the female possesses a white band which also occurs in the male. The species was obtained at from 2000–3500 ft., both at the coast and in the central part of the island.

Mynes dohertyi Holl. ♂♀.

Delias.—Messrs. Pratt collected five new species of this genus. One example proved to be the ♂ of *D. vidua* J. & T., already described in the "Bulletin of The Hill Museum," vol. 1, pt. 2. The species bears a remarkable resemblance to *D. isse echo* Wall., also from Buru, and of which a series was obtained. Whilst *D. echo* has Moluccan affinities, *D. vidua* has much in common with *D. caliban* Sm., from British New Guinea. We exhibit two other parallel cases of resemblance between species of this genus :—

(*a*) *D. subviridis* J. &. T., and *D. echidna* Hew., from Ceram. These belong to different groups.

(*b*) *D. rothschildi* Holl., and a new species, both from Buru. The new form is wonderfully like *D. rothschildi* on both surfaces. It appears to have affinity with *D. dohertyi* Roths., from Timor; this name must, however, sink to *D. dohertyi* Ob., for another species. The Timor form is associated with a similarly coloured *Huphina* as pointed out by Dr. Dixey in Trans. Ent. Soc. 1920, p. 208. A similar *Huphina* has not been found on Buru as yet. Both *Delias* were obtained at the same elevation.

A third new form from Buru is related to *D. joiceyi* Talb., from Ceram. It occurs at 5000 ft., a higher elevation than most of the others.

A fourth novelty represents the Ceram *D. manuselensis* Talb., and the fifth represents the Ceram *D. stresemanni* Roths. All these are quite distinct from their Ceram relatives.

D. funerea buruana Roths., is shown. This species recalls *D. duris* Hew., from Ceram and is doubtless related to it. The female of *D. buruana* presents a close resemblance on the upper-side to both sexes, especially to the female, of *Mynes dohertyi*. On the underside the red basal streak of the hind-wing is common to both. These mimics occurred at the same place.

The exhibitor said that descriptions of the new forms exhibited were being prepared for early publication.

Curious Nemopterid larva.—Dr. H. Eltringham showed on the screen a drawing of the curious Nemopterid larva which had been brought to the Hope Department by Mr. Willmer and exhibited alive by Prof. Poulton at a previous meeting. He gave some account of its structure, and said that a fuller description with notes thereon kindly supplied by Mr. C. L. Withycombe was in course of preparation.

Mr. C. L. Withycombe made some remarks on the anatomy of Nemopterid larvae and said that he thought the one in question was possibly a species of *Nemoptera*.

Mr. E. N. Willmer said the insects were quite common in Egypt in the desert oases and regretted that he had not collected more of them, but he had not at the time realised their rarity.

Scent-organs in New Zealand Trichoptera.—Mr. Martin E. Mosely, who illustrated his remarks with lantern slides, said :—

Amongst a small collection of Trichoptera, sent to me by an angling friend from New Zealand, I noticed in two genera unusual characters which suggested the presence of scent-organs.

Both these genera, *Pycnocentria* and *Olinga*, belong to the Sericostomatidae, a family in which the maxillary palpi of the male are noted for extreme variation from the typical form. They were both described as early as 1860–70, and have been figured by MacLachlan, Ulmer and others. As, however,

these special characters appear to have escaped notice entirely, it is desirable to record them now.

Of the genus *Pycnocentria* there were two species, *P. evecta* McL., and *P. aureola* McL., in the collection, and scent-filaments are present in each. In *P. aureola* the form of the filaments is somewhat obscure, and in no examples were they sufficiently extended to enable me to take a satisfactory photograph. Treatment with caustic potash rendered the filaments invisible. I have been unable with the limited amount of material at my disposal to obtain any very clear idea as to their form and origin. In appearance they are small, somewhat shapeless and white, and protrude from each side of the maxillary palpi.

In *P. evecta* the filaments which have a slight purple tinge are more decided in their outline, and the containing walls are hard enough to withstand the action of potash. They seem to originate between and level with the centre of the oculi. When not in use they are retracted and lie across the face inclining towards each other, and are then covered not only by the upturned maxillary palpi, but also by a special quadrangular plate, which is hinged along the lower edge and is lined with stout hairs. There is a short branch towards the base of each filament, and still further towards the base is a group of stout hairs.

The filaments are elastic even after death. They can be extended to a considerable length with the point of a needle, contracting again when the needle is removed, and, although they show a certain resemblance to the filaments in *Hydroptila sparsa* Curt., they are clearly extensile and not eversile as in this species.

In addition to these two filaments another filament is found at the base of each anterior wing, and in contrast to the head filaments is covered all over with fine hairs. It is withdrawn when not in use into a sheath, formed by a fold in the wing membrane. Similar filaments occur in *P. aureola*.

No trace of androconia could be found on the head, though there are scale-like hairs on portions of the anterior wings. The filaments occur in the male sex only, and in the females the hairs of the wings are normal.

The other insect calling for notice is *Olinga feredayi* McL. In this species the supposed scent-organ consists of thickly clustering and specialised hairs arising from membranous processes which form two rosettes in front of the face. These processes can be detached easily with a needle, and do not form part of the containing walls of the head. It is not impossible that they may be capable of extension into hair-covered filaments, but no example received showed this extension. The rosettes occur in the male sex only, and in this sex also there are scale-like hairs on particular areas of the wings.

ANNUAL MEETING.

Wednesday, January 17th, 1923.

Professor E. B. Poulton, M.A., D.Sc., F.R.S., etc., Vice-President, in the Chair.

Dr. S. A. Neave, one of the Secretaries, read the following

Report of the Council.

It is with great satisfaction that the Council is able to report a steady and most satisfactory progress in all phases of the Society's activities during the year under review.

The highly satisfactory financial position will be explained to you in detail by the Treasurer, to whom the thanks both of the Council and of the Society as a whole are due for his unremitting care of its interests.

The losses in Fellows by death have again been heavy, the number being 16, one less than last year, but there have been only 15 resignations, as compared with 20, and an even larger numbers of new Fellows, 54, as compared with 51, has been elected. The Society now consists of 12 Honorary, 1 Special Life, and 688 Ordinary Fellows, making a total of 701, the largest number in its history.

The Society's Transactions and Proceedings will be of about the same bulk as last year, but are much more fully illustrated. The volume of Transactions will consists of 594 pages, and comprises 20 papers by the following authors :—

C. P. Alexander; H. E. Andrewes; G. J. Arrow; G. T. Bethune-Baker; G. C. Champion; E. A. Cockayne, M.A., M.D., F.R.C.P.; H. Eltringham, M.A., D.Sc; E. Fleutiaux; A. J. T. Janse; H. Mace; G. A. K. Marshall, C.M.G., D.Sc.; E. Meyrick, F.R.S.; M. E. Mosely; N. D. Riley; R. J. Tillyard, M.A., D.Sc.; B. P. Uvarov (2); J. Waterston, D.Sc. (2); and C. L. Withycombe. Of these, 8 deal with

Lepidoptera, 5 with Coleoptera, 2 with Orthoptera, and 1 each with Diptera, Siphonaptera, Trichoptera, Neuroptera and Mallophaga.

The volume is illustrated by 43 plates, of which 4 are in colour, 26 half-tone, 10 line-block, 2 collotype and 1 lithograph. The originals have in all cases been provided by the authors, and substantial contributions toward the cost of the plates in their papers have been made by Mr. Bethune-Baker, Dr. Cockayne, Mr. Meyrick and Mr. Withycombe.

The Proceedings will consist of about 100 pages and are illustrated by 2 half-tone plates.

The meetings have been very well attended, and numerous exhibits of great interest have been made. At the last meeting on December 6th no less than 15, all of a high standard, were shown.

The detailed work of the business of the Society has been carried on by the Finance and House Committee, the Publication Committee and the Library Committee, and the thanks of the Council are due to the Fellows serving on them for the assistance they have rendered. It has recently been decided that two members of each of these Committees shall retire annually, and not be eligible for re-election for one year, with the proviso that in the case of the Finance Committee, technical members, such as the Society's Solicitor and Surveyor, shall be immediately eligible for re-election.

The Librarian reports that increasing use has been made of the Library for reference, and that a greater number of books and separata has been borrowed during the year. Several hundred volumes including journals not hitherto in the Library have been purchased, and there have been considerable donations of separata from the late Mr. Rowland-Brown, the late Mr. Hamilton Druce, Mr. H. Donisthorpe, Dr. Imms, the Rev. F. D. Morice and others, besides the normal current periodicals received by exchange and purchase. An important purchase of valuable books from the Library of the late Dr. Chapman was made during the year, and an endeavour is being made to obtain complete sets of journals in which the Library is deficient.

The Bookcases generously presented by the Misses Chapman

have been placed in the Council Room, and will be most useful for storing some of the more valuable books.

On the unanimous recommendation of the Library Committee the Council has decided that the preparation of a new Catalogue of the Library, which has been urgently required for some time, shall be undertaken almost immediately. This will take the form of a Card Index Catalogue, and a sum of £50 will be allocated for the purpose during the year 1923.

The Librarian wishes to call the attention of Fellows to the Suggestion Book lying on the Library Table, and also to a note-book in the office, which he has compiled, containing a reference summary of the contents of "Genera Insectorum," and of Oberthür's "Lepidoptères comparée" and "Études."

The Council desires to draw the attention of Fellows to the great benefit that would be conferred on the Society by the creation of a Special Fund, by bequest or otherwise, the interest from which would provide a medal in the gift of the Council. Such a medal could be awarded for distinguished services to Entomology or to some special branch thereof, according to the wish of the donor.

The Report was adopted on the motion of Mr. G. T. Bethune-Baker, seconded by Commander J. J. Walker.

The Treasurer's Report.

The Treasurer then read the following Report :—

It is with much pleasure that I am able to report to the Society that the prosperity, which was apparent a year ago, has been sustained, and indeed substantially increased, during 1922.

The finances affecting the Society's "Home" being at present perhaps of the most interest, I will deal with these first.

The Housing Fund was increased during the year by no less than £1272 7*s.* 1*d.* The amounts available for this fund during the past year include a splendid gift of £500 from the Misses Chapman in memory of their brother, the late Dr. T. A. Chapman, F.R.S. A bequest was made by the late Mr. G. A. J. Rothney of £150; Mr. R. Adkin again very generously

cancelled his Debentures amounting to £70 drawn for repayment in September last, and Mr. W. H. B. Fletcher gave a donation of £25. The Society has been able to contribute to this fund from its General Fund the large sum of £333. This was made up of £200 to be allotted annually for this purpose, and the surplus of the amount received for rents in 1921 over the interest paid on Debentures, which, after allowing an amount to provide for the cost of repairs to the premises, amounted to £133.

The amount of Debentures outstanding at the end of 1921 was £4640. Of this £100 was repaid on February 1st last, and a further sum of £815 on September 30th last, making a reduction during the year of £915, and leaving the outstanding amount of £3725. Moreover, as the amount to the credit of the Housing Fund on December 31st was £695 18*s.* 8*d.*, this sum with amounts to be allotted from the Society's General Fund in 1923 make it apparent that I shall be able to repay Debentures of at least the value of £1000 during the present year.

The income arising out of rents received has exceeded the Debenture Interest and the cost of repairs to premises during the year by £152 14*s.* 7*d.*

As the periodical decorative repairs to 41, Queen's Gate will only require to be carried out at intervals of several years, it has been necessary to accumulate a fund to pay for them as and when they occur. The sum of £50 has been taken from the 1921 surplus, and £70 has been allotted for 1922, making the amount standing at present to this fund £120, less the sum of £29 8*s.* 1*d.* spent on repairs in 1922.

In addition to the Bequest alluded to from the late Mr. Rothney, the Society has received an announcement that a very handsome Bequest of £1000 has been made by the late Mr. Hamilton H. C. Druce. The income arising out of this bequest is to be applied to the purchase of books for the Library. Two handsome bookcases have been given to the Society by the Misses Chapman.

Turning now to the General Income of the Society, I am able to report that it is satisfactory in all respects, and in some most satisfactory.

The most startling increase arises out of the sale of the Publications. For many years previous to the Society entering into its new "Home" the amount received from this source ranged from £120 to £150 per annum. In 1921, the first year under the new conditions, it reached £181 11*s.* 3*d.* Last year the sales of Publications amounted to no less than £335 17*s.* 8*d.*, more than double the amount received under the old conditions.

It will be asked how this really wonderful result has been obtained; no doubt from several causes, amongst which I should place the following:—

(1) The undoubted increased prestige the Society has attained. I feel sure that this is the main cause; the world judges a Society just as it judges an individual, by its prosperity, its enterprise, and its methods of carrying out the purposes for which it exists.

(2) The Society has now for the first time a staff and organisation competent to deal with the distribution of its Publications.

(3) Until recently we employed a firm of publishers to sell the greater part of our Publications, paying them a large commission for their services; moreover we allowed publishers and booksellers who purchased our Publications, for sale from us direct, a discount considerably more than was usual. The Council now realises that as it is its own Publisher, it does not require an agent to sell its Publications, because anyone desiring to purchase them must come to it. The discounts now given to the "Trade" are those that are usually allowed, and not the previous too generous allowance.

The amount received for subscriptions for 1922 increased by £22 0*s.* 6*d.* and reached the large sum of £1169 8*s.* 0*d.* Admission fees increased by £32 11*s.* 0*d.*

One result in connection with the subscriptions was particularly gratifying to myself, and I am sure equally so to the Council. It is the unfortunate duty of the Council to have to remove at the end of each year in accordance with the Bye-laws those Fellows who have defaulted in the payment of their subscriptions. In the last ten years the average annual number of these unfortunates has been six. This year I am

glad to say it has not been necessary to remove a single Fellow.

Dealing now with the Society's payments. The Publications have cost £741 1*s.* 10*d.*, an increase of over £200 on the expenditure during the previous year, and the largest amount ever devoted to this purpose. The expenditure on the Library has been £184 1*s.* 11*d.* as against £95 0*s.* 9*d.* in 1921.

In spite of these increases and the amount transferred to the Housing Fund, and after making a liberal allowance for outstanding liabilities, the income has exceeded the expenditure by the sum of £138 3*s.* 8*d.*

The net assets of the Society exclusive of the Library (which is valued by me at £5000) has increased from £3563 12*s.* 2*d.* to £5136 14*s.* 1*d.*, an increase of £1573 1*s.* 11*d.*

The amount of Donations in aid of the Publications was £35 11*s.* 8*d.* I am glad to be able to report a considerable reduction in the cost of Publishing during the past year, and that further reductions are probable during 1923.

In furtherance of the idea embodied in my report a year ago—that the Society should carefully consider its requirements well ahead of the present time—it was decided by the Council that plans should be prepared showing the possible extra accommodation obtainable by developing the rear portion of 41, Queen's Gate, and the area embodied in the present garage at No. 15, Elvaston Mews. Our Fellow Mr. W. Rait-Smith has very generously placed his services at the disposal of the Society, and has prepared plans which are at this moment hung on the walls of the Hall. A study of these will show that a very good Meeting Room, about 45 feet long, 25 feet wide, and 17 feet high, can be obtained, capable of seating about 200 persons; in addition this room would provide wall space for a very large number of books. Ample cloak room and lavatory accommodation can also be obtained, whilst the present rooms over the garage would be available and would furnish much more convenient accommodation for the caretaker than that at present available for him on the fifth floor of the house.

This additional accommodation can be obtained with comparatively little structural alteration to the premises, and

moreover it would not involve any infringement of the light and air of the adjoining property.

An estimate of the cost has not been obtained, but it would not be heavy, and the advantages accruing would be great. I feel very strongly that the Society should make every possible effort to be in a position to make these extensions to its premises when the period of the lease of No. 15, Elvaston Mews expires in 1928.

We are all deeply indebted to Mr. Rait-Smith for the services he has so generously given and for the skilful way in which he has developed his plans.

Portraits of the following distinguished Fellows have been procured and hung in the Meeting Room :—Lord Avebury, Dr. T. A. Chapman, J. W. Dunning, F. D. Godman, Dr. G. B. Longstaff, Roland Trimen, G. R. Waterhouse, Professor J. O. Westwood and G. H. Verrall; others will be added to the Portrait Gallery during the present year.

There are quite a number of distinguished Fellows who are no longer with us whose portraits we unfortunately do not possess, including the following :—J. G. Children, R. McLachlan, F. P. Pascoe and J. F. Stephens. I should be greatly obliged to any Fellow who can inform me how a portrait of any of them can be obtained, or the names and addresses of the living representatives of their families.

The foregoing facts and figures will I trust be held to justify the optimistic forecast I made a year ago as to the Society's prospects and prosperity. I trust, and I am confident, that a year hence, if I am here, it will be my privilege and pleasure to report that the advance in our prosperity has been at least as great during the present year as it has been in 1922.

The Treasurer also read a few extracts from the Financial Statement, and both Report and Accounts were adopted unanimously on the motion of Dr. C. J. Gahan seconded by Mr. W. Rait-Smith.

It was announced from the Chair that the Fellows nominated as Officers and Council for the ensuing year had been duly elected in accordance with the Bye-laws.

In the absence of the President, owing to illness, his Address

was read by Dr. S. A. Neave. At its conclusion a vote of thanks to the President, coupled with the request that it might be printed in the Proceedings was moved by Mr. E. E. Green, seconded by Mr. G. T. Bethune-Baker and carried unanimously.

A vote of thanks to the Officers for their services was then passed on the motion of Professor E. B. Poulton, seconded by Mr. F. D. Morice, and Mr. W. G. Sheldon, Dr. S. A. Neave and Mr. H. J. Turner briefly replied.

(Presented at the Annual Meeting, January 17, 1923.)

RECEIPTS AND PAYMENTS ACCOUNT.

Receipts.	£ s. d.	£ s. d.
To Cash at Bank as per last Account—		
General Account	543 17 2	
Compounding Fund	66 2 4	
Westwood Bequest Fund	7 3 8	
Library Fund	57 18 10	
		675 2 0
„ Interest on Investments—		
Birmingham 3% Stock (Westwood Bequest)	7 3 8	
Consols	33 17 0	
National War Bonds	19 2 3	
„ Interest on Deposit—		
General Account	15 5 4	
Housing Fund	5 17 4	
„ Rents from Sub-tenants	390 0 0	
		471 5 7
„ Contribution by Tenants towards House Expenses		138 12 11
„ Admission Fees		163 16 0
„ Annual Subscriptions—		
Arrears	65 0 0	
1922	1,140 0 6	
In Advance	17 17 0	
		1,222 17 6
(Subscriptions for 1922 received in 1921, £29 8*s.*)		
„ Sales of Publications		335 17 8
„ Donations in aid of Publications		35 11 8
„ Miscellaneous Receipts		6 19 10
		£3,050 3 2

Payments.	£ s. d.	£ s. d.
By Salaries		325 1 3
„ Library—		
New Books	134 13 7	
Binding, Repairs and Insurance	49 8 4	
		184 1 11
„ Cost of Publications—		
Printing and Distribution	608 11 4	
Illustrations	132 10 6	
		741 1 10
„ Sundry Printing and Stationery		36 13 4
„ Postages		30 17 9
„ Audit Fee		10 10 0
„ Miscellaneous Expenses		53 11 2
„ House Expenses—		
Fuel, Gas, and Electric Light	70 4 7	
Insurance	11 5 6	
Water	19 19 11	
Repairs and Alterations to Premises and Furniture	39 19 7	
Additions to Furniture	3 1 9	
Sundry Expenses	6 5 4	
		150 16 8
„ Interest on Debentures (less tax)		150 10 8
„ Income Tax 1921 Balance and 1922		107 4 9
„ Purchase of £63 4*s.* 5% National War Bonds, 1928		65 12 6
„ Transfer to Housing Fund		333 0 0
„ Cash at Bank and in Hand—		
General Account	682 18 4	
Compounding Fund	82 7 10	
Library Fund	5 3 3	
Repairs to Premises Fund	90 11 11	
		861 1 4
		£3,050 3

MEMORANDUM AS TO ASSETS AND LIABILITIES AT DECEMBER 31, 1922.

ASSETS.

	£ s. d.	£ s. d.
To Freehold Premises 41, Queen's Gate, S.W. Cost of Purchase		6,250 0 0
„ Library, Furniture and Fittings ...	Not valued *	
„ Present value of—		
£1,354 2*s.* 2*d.* 2½% Consols, Compounding Fund (Cost £1,233 3*s.*)	751 10 6	
£413 18*s.* 1*d.*, 5% National War Bonds 1928 (3rd Series), Compounding Fund (Cost £340 5*s.* 2*d.*)	438 14 9	
£239 12*s.* 4*d.* Birmingham Corporation 3% Stock, Westwood Bequest (Cost £250)	155 14 9	
		1,346 0 0
„ Amounts due to the Society—		
Subscriptions	167 6 0	
Admission Fees	25 4 0	
Publications	12 5 7	
Rents and Contributions to House Expenses	132 10 0	
Sundries	11 5	
	337 17 0	
Less not considered good	20 0 0	
		317 17 0
„ Cash at Bank and in Hand—		
General Account:		
Current Account £0 0 0		
On Deposit 867 0 0		
In hands of Secretary ... 9 5 4		
In hands of Treasurer ... 2 2 0		
878 7 4		
Less Current Account Overdrawn 195 9 0		
	682 18 4	
Housing Fund—Current Account ...	695 18 8	
Compounding Fund—Current Account	82 7 10	
Library Fund—Current Account ...	5 3 3	
Repairs to Premises Fund—Current Account	90 11 11	
		1,557 0 0
		£9,470 17 0

LIABILITIES.

	£ s. d.	£ s. d.
By Amounts Due from the Society—		
Printing Transactions, Parts III, IV, and V	396 2 2	
Sundry Accounts	148 12 6	
		544 14 8
„ Subscriptions received in Advance ...		17 17 0
„ 5 % Debentures—		
Issued to provide for Purchase of 41, Queen's Gate, S.W.:		
As at 1st January, 1922	4,640 0 0	
Less Repaid during year ...	915 0 0	
	3,725 0 0	
Add Interest Accrued	46 11 3	
		3,771 11 3
„ Excess of Assets over Liabilities—		
General Account	391 12 5	
Housing Fund	3,220 18 8	
Compounding Fund	1,272 13 1	
Library Fund	5 3 3	
Westwood Bequest Fund	155 14 9	
Repairs to Premises Fund... ...	90 11 11	
		5,136 14 1
		£9,470 17 0

HOUSING FUND (TOTAL RECEIPTS AND PAYMENTS TO DECEMBER 31, 1922).

Receipts.

	£ s. d.	£ s. d.
To Receipts to December 31, 1921 ...	9,451 9 3	
,, ,, in 1922	1,272 7 1	
		10,723 16 4
		£10,723 16 4

Payments.

	£ s. d.	£ s. d.
By Payments to December 31, 1921 ...	9,107 9 8	
,, ,, in 1922	920 8 0	
,, Cash at Bank at date	695 18 8	
		10,723 16 4
		£10,723 16 4

HOUSING FUND (AMOUNTS RECEIVED IN 1922).

	£ s. d.	£ s. d.
To Balance at Bank as per Last Account		343 19 7
,, Transfer from General Account ...	333 0 0	
,, Donations	939 7 1	
		1,272 7 1
		£1,616 6 8

	£ s. d.	£ s. d.
By Repayment of Debentures	915 0 0	
,, Stationery and Printing	5 8 0	
		920 8 0
,, Cash at Bank		695 18 8
		£1,616 6 8

WESTWOOD BEQUEST FUND.

	£ s. d.	£ s. d.
To Balance at Bank, January 1, 1922	7 3 8	
,, Interest on £239 12s. 4d. Birmingham 3% Stock ...	7 3 8	
	14 7 4	
By Amount Paid on Account of Cost of Plates for Parts III and IV of Transactions, 1922		14 7 4

LIBRARY FUND (NEW BOOKS).

Receipts.	£	s.	d.	Payments.	£	s.	d.
To Balance at Bank, January 1, 1922	57	18	10	By Expenditure on New Books	134	13	7
,, One-half of Admission Fees received in 1922 ...	81	18	0	,, Balance at Bank at date	5	3	3
	£139	16	10		£139	16	10

COMPOUNDING FUND.

	£	s.	d.		£	s.	d.
To Balance at Bank, January 1, 1922	66	2	4	By Investment in £63 4s. 5% National War Bonds, 1928	65	12	6
,, One-half of Admission Fees received in 1922	81	18	0	,, Balance at Bank at date	82	7	10
	£148	0	4		£148	0	4

REPAIRS TO PREMISES FUND.

	£	s.	d.		£	s.	d.
From General Account for 1921	50	0	0	By Payments	29	8	1
,, ,, ,, ,, 1922	70	0	0	,, Cash at Bank	90	11	11
	£120	0	0		£120	0	0

W. G. Sheldon, *Treasurer*.

We have audited the Treasurer's Accounts of Receipts and Payments and the Statement of Assets and Liabilities with the Books and Vouchers of the Society, and certify them to be correct. Messrs. Burch & Co., Solicitors, of 6 Bolton Street, W., have certified to us that they hold the deeds of the property on behalf of the Trustees for the Debenture Holders. We have verified the other Investments and Bank Balances.

23, *Queen Victoria Street, London, E.C.* 4.
January 16, 1923.

(*Signed*) W. B. Keen & Co., *Chartered Accountants.*

THE PRESIDENT'S ADDRESS

Ladies and Gentlemen,

The Reports of the Council to which we have been listening confirm our expectation that the new chapter in the history of the Society, inaugurated by the acquisition of premises of its own, would be the beginning of a period of increasing activity and prosperity. It is very satisfactory to hear from the Treasurer and Secretary of the sound state of our finances and of the large number of new Fellows who have joined the Society in the course of the year, and it is most gratifying that, in spite of the great cost of printing, we have been able to keep up the standard of our publications without undue strain on our resources. I need not comment further on the Reports presented to you, except that I should like to give renewed expression of our gratitude to all who have assisted the Society by donations, and in particular to the Misses Chapman for their generous gifts.

There is every year one point in the Council's Report which fills us with regret, the list of Fellows who have died in the course of the year. In 1922 death has again taken its heavy toll, and we have lost friends and fellow-workers whom we shall miss very much.

A. W. Bacot, the Entomologist of the Lister Institute, frequently exhibited at our meetings parasitic insects which he studied in connection with the transmission of diseases. His devotion to this humanitarian subject has cost him his life. While on a mission to Egypt in order to ascertain more fully the bionomics of the parasites which transmit typhus and kindred diseases, he contracted typhus and fell a victim to it. His contributions to his particular branch of applied Entomology are not only numerous, but in consequence of

the great pains he took in this delicate work, also of great value to medical Entomology.

H. Rowland-Brown, barrister, journalist, poet and entomologist, who died in May 1922, a few weeks short of 57, was a very familiar figure at the gatherings of Entomologists. He was best known to us as a very efficient secretary to our Society, devoting much time and energy to this office. When his final breakdown early in 1922 compelled him to give up his active connection with the Society, we lost in him a most genial companion and colleague. He was most interested in European butterflies, on which he has published a number of articles in various magazines.

With W. L. Distant, who died on February 4th, 1922, our foremost authority on Rhynchota has passed away. To the younger Entomologists who knew him as a famous Rhynchotist it generally comes somewhat as a surprise to learn that he was also the author of the splendid volume "Rhopalocera Malayana," a book still indispensable to everyone who is interested in Malayan butterflies. Lepidoptera were his early love, but he soon left them in order to devote himself mainly to Rhynchota. His contributions to the study of this order of insects are so extensive that it is impossible to give an adequate idea of them in a short notice. Foremost among his publications are the seven volumes on Heteroptera and Homoptera in the Fauna of British India, some volumes in the "Biologia Centrali-Americana," and the "Insecta Transvaalensia."

Hamilton H. Druce was only 54 when he died in June last. Many of us have profited by his knowledge of the Lycaenidae and Hesperiidae, in which families he was a specialist. His publications referred almost exclusively to these families, of which he had a fine collection, now in Mr. J. J. Joicey's possession.

H. J. Elwes, president of this Society in 1893–4, took a wide interest in many branches of natural sciences, in botany no less than in zoology. Circumstances permitted him to follow his temperament and devote much time to travelling in foreign countries, where he employed to great advantage the opportunities he had in unexplored fields. His interest in

Entomology was almost restricted to Lepidoptera, of which he had an extensive collection. His works on *Parnassius*, *Erebia* and on Oriental Hesperiidae are among the best known publications on these subjects. Some of his botanical works, such as the "Monograph of the Lilies" and "The Trees of Great Britain and Ireland," are magnificent productions.

G. A. Rothney, well known as a student of Hymenoptera, particularly of the Oriental fauna, died on January 31st at the age of 72. His valuable collection and books relating to the subject were presented by him to the Hope Department at Oxford.

Much useful work in the exploration of local faunae has been accomplished by our lamented colleagues W. M. Geldart, the Coleopterist, and Lachlan Gibb, A. Horne, A. Marshall, and R. H. Moore, whose contributions to the knowledge of British Lepidoptera are found in the Entomologist and other magazines.

From the colonies the news has reached us of the death of our Fellows R. M. Lightfoot, at the Cape of Good Hope, F. M. Littler, in Tasmania, G. Storey, in Cairo and J. Winterscale, in Perak.

On August 27th passed away one of the most distinguished Coleopterists of our time, Dr. David Sharp, president of this Society in 1887–8, special Life Fellow since 1921, and corresponding and honorary member of many foreign societies. His works on various groups of British Coleoptera, on the Dytiscidae of the globe, on the beetles of New Zealand, Japan, and Central America, and especially the volumes on Insects in the Cambridge Natural History series, to mention only a few of his more important contributions to our science, are known and used all through the entomological world. He died at the ripe age of nearly 82, after a life full of devotion to the work he loved.

W. Purdey, who died on the 1st of February, was well known to most British Lepidopterists as a very successful collector of Microlepidoptera in the neighbourhood of Folkestone, where he lived. Many of us have corresponded with him and have in our collections specimens obtained by him.

The death is also announced of L. Bedel, of Paris, one of the best contemporary French Coleopterists, and of two very successful collectors of Lepidoptera in the tropics, H. Fruhstorfer, who died at Munich, and A. H. Fassl, who has been carried away by the vicissitudes of the climate of the Amazons.

I will now address you

On some Aspects of Variation in Lepidoptera.

Looking back in mind on the exhibits and discussions during the two years I have had the honour of occupying the presidential chair of the Entomological Society of London, I think I am right in saying that two subjects have claimed much of our attention and interest: (1) the dissimilarity among the individuals of Lepidoptera which constitute a species—or variation, and (2) the similarity obtaining between many different species—or mimetic resemblance. The two subjects are so closely interwoven that one cannot deal with the one without touching upon the other. We are all familiar with the fact that the variation of a species is a two-fold one: we observe on the one hand the differences between the individuals of a species within a faunistic district—or synpatric variation, and on the other hand the differences which are perceived if the whole range of the species is taken into account—or dyspatric variation. Although for you, who have studied variation in one group of insects or the other and have seen at the meetings the exhibits bearing on the subject, there will hardly be anything new in what I have to say on the variation of Lepidoptera, the two-fold aspect of variation is very little understood outside the circle of active systematists and field-biologists. While the publications on systematics consist to a large extent of the differentiation between the geographically separated races of species, in the works of philosophers explaining the world to us scarcely any notice is taken of this side of variation—or it is impatiently waved aside, as for instance by the famous philosopher Nietzsche, who, in a chapter against the Darwinian explanation of evolution, says about the modifications through the influence of food and climate that "they are in reality absolutely negligible." You will agree with me, I know, that in these circumstances it is a duty of biologists to

counteract such one-sidedness by emphatically stating again and again that the variation of the species from district to district is the rule and not the exception, and it appears to me appropriate that a protest should be uttered from this place, because Entomology plays such an important part in the elucidation of the problems of life.

Every Entomologist with a little experience is aware that in any district where there is no physiographical barrier preventing a promiscuous interbreeding of the specimens of a species, the community of individuals may be practically uniform or may be variable, there being a gradation from uniformity as the lower extreme to polymorphism as the upper extreme. The diversity between the groups of individuals of polymorphic species is frequently so great, and the differences are often so sharply defined, that in many instances the varieties have been mistaken for species until their true status was discovered. The variation is either independent of sex, or is sexual or partly sexual. *Papilio clytia* from India with a striped and a brown form in both sexes may be taken as an example of non-sexual dimorphism; *Hypolimnas dubius wahlbergi* from South Africa is sharply dimorphic; and *Papilio lysithous* is trimorphic in Rio Grande do Sul and other parts of South-east Brazil. Sexual dimorphism goes often very far in Lepidoptera. The wingless females of Psychidae and some other Heterocera may be mentioned as one extreme development, but equally striking are the differences in the shape and colouring of the wings in numerous other Lepidoptera, of which some species of *Troides*, *Papilio*, *Planema* and *Argema* here shown may serve as examples. Very often each sex appears in one form only; in many instances, however, one sex or both are split up into two or more forms; this is frequently the case among Papilionidae and Nymphalidae (*Papilio memnon*, *P. polytes*, *P. rumanzovia*, *P. androgeus*, etc.; *Hypolimnas*, *Hestina*, *Charaxes*, etc.). Common as the phenomena of di- and polymorphism are in Lepidoptera the distribution of the different kinds of variation among the various families is by no means uniform, there being several points in its occurrence that appear to me of some interest. The strong reduction or loss of the wings occurs only among

Heterocera, being sporadically found among Geometridae, Arctiidae, Lymantriidae, Lasiocampidae, Hepialidae, and obtaining in all species of Psychidae, Heterogynidae and Somabrachidae; in Noctuids this line of development is fairly advanced in certain Alpine species, the females of which seek safety in crawling into the ground or the herbage like a Carabid beetle rather than trusting to the shortened wings, while in some other Noctuids the wings are quite reduced. As a rule the females of Heterocera are larger than the males, the difference frequently being so great that one would hardly believe in the specimens being the sexes of the same species, as for instance in some Lasiocampidae and Saturniidae. On the other hand, it happens also that the male is rather larger than the female and, moreover, has acquired a modified contour of the wings, as for instance in some species of the Saturnian genus *Oxytenis*, of which the males have been placed in one genus and the females in another far removed from the former. The differences in the colouring and pattern of the sexes are likewise often very striking in Heterocera. All this shows that the Heterocera have the faculty of acquiring a great sexual diversity. That being so, is it not remarkable that there is among night-flying moths no such clear-cut polymorphism as we so frequently observe among butterflies? I said night-flying moths, because there *is* sharply marked polymorphism also among Heterocera, for instance among Arctiidae, Agaristidae, and Zygaenidae, but—and this is an important point—the species in which this obtains are day-fliers like the butterflies. I mention as an illustration the Agaristid *Immetalia saturata*, a day-flying moth to which I shall refer again later on. Here sunshine and polymorphism are coincident, and does it not look as if sunshine was a condition for the development of polymorphism? But that is not all. In the majority of polymorphic day-fliers and in numerous sexually dimorphic species the pattern and colour are more or less the same as those of other species occurring along with them. The various forms of *Papilio lysithous*, from S. E. Brazil, fly in the same localities as the various distinct species of *Aristolochia* Papilios which they resemble. The numerous forms of *Pseudacraea eurytus* are repetitions of the colouring and pattern

of a number of distinct species of *Planema*. The two forms of *Hypolimnas dubius* look like the two distinct species of *Amauris*, which are shown along with them on the slide. The females of the Chalcosiinae often bear a close resemblance to butterflies, while the males are quite different, for instance the female of *Cyclosia hecabe* might easily be mistaken for the Pierine *Terias hecabe*, and the female of *Cyclosia papilionaris* for a Danaine butterfly. Many other instances of such resemblances between sympatric species have been exhibited at our meetings. If we compare this kind of daylight di- and polymorphism with the kind of differences obtaining in night-flying Lepidoptera, in which evolution tends to produce a resemblance to dead leaves, lichens, twigs, pebbles, etc., the three-fold coincidence of (1) daylight, *i. e.* visibility, (2) sharply marked and conspicuous di- and polymorphism, and (3) resemblance to sympatric species, forms such a striking contrast that nobody can seriously maintain it to be due to pure accident. There must be some connection between the three concurrences; we require an explanation; we cannot look upon these facts as merely curious; and the explanation most satisfactory and which faces the facts squarely is that given by Natural Selection acting on the varieties produced by the influence of the physical conditions (in the widest sense) of the environment, however strong the modern and popular tendency may be to decry Natural Selection as a factor in Evolution.

We now come to the second kind of variation which no field-entomologist can have failed to observe who has ever collected in two different faunistic districts, such as Scotland and the South of England, or Central Europe and the Mediterranean countries. We have seen here exhibited many illustrations of geographical variation, with regards to tropical countries particularly from the collections of Mr. Joicey and Mr. Kaye. A collector passing from one district into the geographically nearest but faunistically different country, will meet with many familiar species which, however, to him as an expert have an unfamiliar appearance; they are the old friends, but with a difference. Let us take as an example the Lepidoptera of Great Britain and Ireland. We read in Wallace's "Distribution of Animals," in the chapter on the

British Islands, that " their animal productions are so uniformly identical with Continental specimens as to require no special mention," only " some few British species differing slightly from their continental allies." This opinion no longer holds good, a rather large proportion of the resident species of these islands being now known to differ in some way or another from Continental or at least Central-European specimens. That is not due to a change in the animals since Wallace's time, but to a difference in the method of working on the part of the systematist. As in everything, there are also two sides to systematics : similarity and dissimilarity. If one of the two sides is emphasised to the detriment of the other, a wrong picture is presented of the actual state of things, and those who rely for general conclusions on the work of the systematist are bound to arrive at an erroneous conception of nature. In Wallace's time the tendency was in the direction of appreciating the similarity of the specimens from different countries rather than the differences, which appeared superficial and unimportant. For the Ornithologists of that time a Robin from England, Germany or Madeira was a Robin; they were quite right inasmuch as these countries each have a Robin, but were wrong in implying that these Robins were identical. And that applies equally to a multitude of other species in all orders of animals. We now speak of Scotch forms of Lepidoptera, of British and Irish forms, and it is common knowledge among British Lepidopterists that in a number of instances the species are not identical even in different districts of England. The Oak-egger from the shingle beach of Sheerness is very different from the form found inland; the Ruby Tiger (*Phragmatobia fuliginosa*) from the mountains of Scotland is very distinct from more southern specimens; *Coenonympha davus* from Scotland and Northern England are by no means alike; and *Melitaea artemis* from Kent, Cornwall and Ireland show considerable differences. The Irish *Satyrus semele* and *Spilosoma mendica* contrast strongly with British specimens; and the *Hepialus humuli* from the Shetlands in which the sexes are practically alike in markings, while in other countries the species is sexually dimorphic, is one of the well-known classical examples of geographical variation.

From the examples mentioned we must not draw the conclusion that local forms always exhibit some conspicuous distinction. On the contrary, a large proportion are but slightly different, or their differences are inconstant. Our knowledge of this side of the variation of British Lepidoptera is still far from being complete. It will require a great deal more collecting and patient study before we have a satisfactory survey of the variation of the Lepidoptera within the British Isles, and particularly before the differences between our insular fauna and that of the Continent can be clearly demonstrated in all its aspects. Here is a field for the younger Entomologists, and I should recommend the thorough study of a few species throughout the British Islands and at least Western and Central Europe as a task well within the capacity of any enthusiast. The results of such research, for instance upon species like *Pieris napi* and some of the commoner Satyrinae, would be most valuable, especially if the distinctions observed were tested by experiments in breeding.

Among the Continental Lepidoptera the species of which the geographical variation has attracted most attention in recent years, is *Parnassius apollo*, which extends from the Sierra Nevada in the south of Spain over the mountainous countries of Central Europe southward to Sicily and eastward to Central Asia, reappearing in the north in the Baltic countries. The local races described of *P. apollo* are now almost innumerable. The species varies so much locally that every mountain stock and every isolated range has its own race, some easily distinguished, others overlapping in characters, and others evidently bearing a different name because they are from another valley. I will not multiply the illustrations of geographical variation in European Lepidoptera, many of you knowing as much about it as I do, or more, but will proceed to show some examples from the tropics.

As you know, the phenomenon of geographical variation was first clearly perceived and stated by Bates. The observations upon which this explorer based his opinion were made in the tropics, and scientists at home were long under the impression that this kind of modification of a species in different districts obtained in tropical countries rather than in the temperate

zone. That was a misconception, but an excusable one. In the tropics there are so many more brightly coloured and large species than in the temperate countries, and the differences in large and gaily coloured specimens appear so much more pronounced for our eyes than those obtaining in small and sombre-coloured species that, with this reservation, the tropical species may be said to exhibit the various kinds of variation in a more intense form, but the geographical variation is just as regular a phenomenon in the temperate zones as in the tropics. The classical countries where Bates and Wallace made their discoveries are the Amazons and the Malay Archipelago. Considering the continuity of the Amazon basin from the Andes to the Atlantic, and the slight rise in height from sea-level at Pará to little over 300 ft. at the foot of the Andes, a distance of nearly 2000 miles, Bates must have been fairly startled by the modifications within the species collected by him at Pará on the Lower Amazons, Obidos and Manáos on the Middle Amazons, and Ega on the Upper Amazons. We take it now as a matter of course that we receive different species or different geographical races from these three Amazonian districts. After a fact of this kind has been clearly pointed out, it is easy to follow the lead and apply that knowledge also elsewhere. The geographical variation discovered by Bates on the Amazons we now know to obtain in a no less marked degree on both American continents in the direction from east to west as well as from north to south. A tropical species which has spread north and south into the temperate countries is usually represented by a different geographical race in the east of the U.S.A. and in the Western States, in East Mexico and in West Mexico, the eastern Mexican race extending as a rule south into Honduras and even Nicaragua, another race again in Costa Rica and Panama, West, Central, and East Colombia, and so on.

Experience has taught us that in Africa, south of the Sahara, the chief faunistic provinces as regards Lepidoptera are likewise well marked. Without going into detail I mention that the West African forest region has two major provinces, the one extending from Senegambia to the Niger, and the second from the Niger to the Congo basin; South Africa has generally

its own races, and the East African coast districts are faunistically different from Somaliland and Abyssinia as well as from the districts of the lakes in the interior. I show you as illustration of this division of African species into geographical varieties *Papilio menestheus* from Sierra Leone, the Congo and South Africa, and along with it *Charaxes brutus*, which varies in a similar way. These two species have been chosen because they illustrate another interesting phenomenon: Congolese varieties of many species are larger and have the markings reduced, the South and East African varieties have larger markings and usually have distinct submarginal spots on the hind-wing, while these spots are often missing or reduced in the West African forms. This by the way.

In the Indo-Australian countries geographical variation is equally pronounced. Ceylon, South India, North-west India, Sikkim and Bhutan, the Assamese Hills south of the Brahmaputra, Burma, Tenasserim, the Malay Peninsula and nearly all the islands or groups of islands of the Indian and Pacific oceans have each its special local races. For instance, *Papilio sarpedon*, extends from Ceylon to Japan and eastwards to the Solomon Islands; it is broken up into a multitude of geographical forms, some of which we show on the slide. I draw your attention to the seasonal difference in North Indian specimens, further to the dimorphism in the Chinese summer specimens, and to the large size and strongly falcate forewing of the specimens from the lowlands of Celebes and the Sulla Islands; the slide, further, illustrates a variation I have as yet not mentioned, that is the difference frequently found in specimens from different altitudes. On Celebes as well as Ceram there exists a lowland race and a mountain race of *P. sarpedon*, very unlike each other, and undoubtedly derived from different sources, the lowland race of Celebes being of Moluccan origin and the mountain race of Malayan derivation, while in Ceram the one is truly a Moluccan race and the other has its affinitive in New Guinea. On the whole *P. sarpedon* has a limited individual variation, the specimens, apart from Central and West China, being practically uniform in each locality. The problem is much more complicated and also much more interesting and instructive in the case of

sympatrically polymorphic species. Earlier in this address I have mentioned the Agaristid *Immetalia saturata* as a day-flying polymorphic species. This moth occurs in Southern New Guinea in three individual forms, both sexes being either white-banded on both wings, or white-banded on the fore-wing and orange-banded on the hind-wing, or orange-banded on both wings, a sharply marked trichromatism, a fourth form, with the band of the hind-wing replaced by a few white scales, being represented by a single female in my collection. In Northern New Guinea, at a low altitude, the ♂ is always white, but the ♀ is either white-banded like the ♂, or white-banded on the fore-wing and orange-banded on the hind-wing, or orange-banded on both wings. In Eastern New Guinea (in the district around the Huon Gulf), and on the islands off the north-east coast, both sexes are always orange-banded. On the Southern Moluccas—we have only a few specimens from Aru and Key, and do not know the extent of variation on these islands—the band of the hind-wing is always missing, at least in the lowlands, the band of the fore-wing being white in the Ceram ♂ and either white or orange in the Ceram ♀, white in both sexes on Amboina, and orange in both sexes on Buru. In the Northern Moluccas both wings have a band, which is always orange in both sexes. That is to say: a species tetramorphic in one district appears in another district monomorphic in the ♂, trimorphic in the ♀, in other places sexually dimorphic, or entirely monomorphic. A somewhat similar case is that of *Papilio clytia*. In India and Indo-China it occurs in two main forms, each individually variable, a streaked form and a brown one; in North India occasionally intermediates appear which are not known from any other district. In the Andamans occurs only a streaked race, on Palawan a monomorphic brown race or, if you like, species, and on Timor and neighbouring islands the species is represented by a streaked *Papilio*, the islands in between and Malacca being inhabited by the specifically distinct, though closely allied, *Papilio paradoxus*, the mimic of various Euploeas. As a third example of polymorphism I mention *Papilio memnon*. In this species the ♀ is of particular interest, though the ♂ also varies geographically. The point to which I wish

to draw your attention is this : while in Java, Sumatra, the Malay Peninsula, India, etc., one of the several females is tailed, there is no tailed *memnon*-♀ on Borneo; the Bornean form which corresponds to the tailed one of Sumatra has preserved the pattern distinctive of the tailed ♀, but the tail has been lost entirely.

Now let us for a moment consider geographically separated varieties of Lepidoptera from quite a different point of view. Along the west coast of Sumatra there is a chain of islands each of which has its own, numerous, races of Lepidoptera, many of the races being markedly different from those found on Sumatra. On the other hand, the Natuna Islands between Borneo and the Malay Peninsula are farther from Borneo than, for instance, Nias is from Sumatra, yet their Lepidoptera do not exhibit such conspicuous modifications as do those of Engano, Mentawei, Nias, etc. What is the reason for this difference in the degree of variation? The insects in question being the same species, the cause of their greater modification on the one group of islands than on the other must be sought for in the nature of the islands, using the word nature in the widest sense, including the age of the islands. Entomologists know very well that a geographically old district separated by sea or low lands from the nearest geologically old district has its own geographical races. The modifications in the species may refer either to colour, size, shape, or structure, or to all, the species not reacting all in the same way. That is to say, geographical variation also depends on the nature of the insect. If we see it stated that a certain species has a very wide distribution, but does not exhibit any geographical variation, at once the explanation forms itself in our mind either that the species is carried frequently from place to place by the power of its wings or some other means, or that the species has not been carefully studied. And in most instances we find that nature has not made an exception, but that the systematist has made a mistake.

We have briefly considered first variation in one and the same locality and then variation in different localities, and now this question presents itself : are the varieties, whether local or geographical, all of the same value as regards evolution?

For instance, are a dark and a light form which occur together the same as a dark and a light form which are geographically separate? Staudinger and many other Lepidopterists have given an affirmative answer. In Staudinger's Catalogue of Palaearctic Lepidoptera many forms are designated as "var. et ab.," *i. e.* they are considered to be individual aberrations in one place which have developed into geographical varieties in another. Looking superficially at collections it appears indeed to be so. But appearances are frequently misleading. The true bearing of a problem, whether in science, politics, economics or ethics, is more easily perceived, if the problem is pursued to its logical extreme. I will give some instances by way of illustration. The two specimens of the Geometrid *Triphosa dubitata*, both from Tring, differ in the one being paler than the other. If this difference became so normal in British *dubitata* that we had only dark specimens and pale specimens, development progressing in the same direction would result in well-marked dimorphism and no more; the dark form and the pale one would contrast strongly, but would nevertheless still form an interbreeding community. Compare now a Chinese specimen with the European ones. The Chinese examples are so similar to them that they have not received a name; they are, however, characterised by some slight structural difference in the genitalia. The geographical separation is here accompanied by a structural separation. What would be the result if this line of development was carried on? The other Lepidoptera on the slide will give the answer. They are both from the Oriental Region and taken quite at random from my collection, being selected for no other reason but the wide distribution assigned to them and, as we thought, the absence of any conspicuous geographical distinctions. As it happens, the outward appearance has proved deceptive. The Geometrid *Nobilia turbata* is said to occur from India to New Guinea; the three specimens figured show some very slight differences, but these are so fluctuating in a series that all the specimens stand in collections under one name. An examination of the structure, however, proves that there are an Indian, a Malayan and a Papuan form, so different that interbreeding would be difficult. The

other insect is a Noctuid, *Oxyodes scrobiculata*, a very common species throughout the Oriental Region, a distribution from Ceylon to New Caledonia being assigned to this moth. The differences in colouring are slight and so unstable that nobody seems to have suspected this *O. scrobiculata* to be composed of a number of forms. A study of the structure upsets the notion of uniformity altogether. What we call *O. scrobiculata* comprises the following forms: (1) the first figure represents a Ceylonese specimen; all Ceylonese and South Indian examples are sharply defined by the structure of the tail-ends, and this form extends into North India, where it occurs together with the next one, the differences being such that interbreeding would be interfered with; (2) from North India over Indo-China to Sumatra and Borneo a second form is found; (3) from Palawan and Java to Timor and New Caledonia occurs a somewhat brighter yellow insect with widely different tail-ends, and (4) in Queensland we find again a form structurally similar to the Indo-Malayan one, but different in some detail. There can be no doubt that both in the Geometrid *Nobilia* and the Noctuid *Oxyodes* the various forms are modifications derived from the same original stock. Their distribution proves that each form attained its high degree of diversity in an area geographically separate from the countries inhabited by the sister forms. That is to say, geographical segregation has here led to structural segregation and finally to such great diversity that the resulting varieties are as distinct as species. This conclusion based mainly on the morphology of the insects is corroborated by other observations on geographical varieties. It was Standfuss, I think, who first noticed that varieties from the same or similar locality were much easier to cross than geographically separate varieties, the aversion existing between species being already present to some extent in geographical varieties. Moreover, the fertility of such crosses was found to be impaired, and the offspring to be intermediate between the parents, as in the case of crosses between species. Further, according to observations on the fertilisation of the egg-cell and the subsequent fate of the ♂ and ♀ nuclei, the number of particles into which the nucleus of the fertilised egg breaks up in the process known as

karyokinesis varies but slightly within each species, no matter whether the synpatric specimens crossed are externally similar or dissimilar, and differs from the number observed in allied species. If, however, two species are crossed, the number of particles is very much lower, while an intermediate number results in the case of the crossing of two geographical races of a species. That is a most interesting confirmation of the conclusion drawn from the morphology of the imagines that geographical races are of a different standing in evolution than individual varieties.

However, in practice it is not always easy to decide whether a variety is really geographical. We have seen here exhibited more than once a certain class of variety which appears in years with an abnormal season. An excessive and prolonged rainfall or continued drought has a marked influence on the size and colouring of the Lepidoptera. Such wet or dry forms would disappear with the return of the climate to normal conditions. The material in our collections from tropical countries is frequently collected in one season only, or even in a few weeks, and in such circumstances we may easily take the product of an abnormal spell of weather for a geographical variety. The documentation in our collections unfortunately is limited, and therefore the work based on them remains always open to correction.

I thank you for the attention with which you have listened to this Address. Before leaving the Chair I should like to give expression to my gratitude to the Officers and Council for their untiring assistance extended to me during my term of office, and to the Society for having honoured me by the election as its President. The two years were full of interesting experience, and they will always remain as a very pleasant memory.

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ERRATA.

TRANSACTIONS.

Page 196, after line 39 insert VENEZUELA.
Page 268, Fig. 1, etc., for *lircea* read *lircaea*.
Page 268, Fig. 1, etc., *for* Butl. *read* Hew.
Page 303, line 22, *for* Jamieson *read* Jameson.
Page 339, line 26, and page 350, line 26, *for* Tongido *read* Longido.
Page 351, line 30, *for* Kbwezi *read* Kibwezi.
Page 356, line 34, *for* Wyangori *read* Nyangori.

MADE AND PRINTED IN GREAT BRITAIN. RICHARD CLAY & SONS, LTD., PRINTERS, BUNGAY, SUFFOLK.

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